SUNRISE WIND LLC

SUNRISE WIND NEW YORK CABLE PROJECT

REVISED EXHIBIT 4

ENVIRONMENTAL IMPACT

PREPARED PURSUANT TO 16 NYCRR § 86.5

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Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
A	ampere(s)
AC	alternating current
ADCP	Acoustic Doppler Current Profiler
AIS	automatic identification system
AMAPPS	Atlantic Marine Assessment Program for Protected Species
AMCS	Atlantic Marine Conservation Society
amsl	above mean sea level
Applicant	Sunrise Wind LLC
ASMFC	Atlantic States Marine Fisheries Commission
bgs	below ground surface
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
BPA	Bonneville Power Administration
CAA	Clean Air Act
CEA	Critical Environmental Area
CETAP	Cetacean and Turtle Assessment Program
CFCS	Center for Coastal Studies
CFE	controlled flow excavation
CFR	Code of Federal Regulations
CFSR	Climate Forecast System Reanalysis
CGA	Compatible Growth Area
CH_4	methane

CIRP	Coastal Inlets Research Program
CLCPA	Climate Leadership and Community Protection Act
cm	centimeter(s)
CMECS	Coastal and Marine Ecological Classification Standard
CMP	Coastal Management Program
cm/s	centimeters per second
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPA	Core Preservation Area
CPB CLUP	Central Pine Barrens Comprehensive Land Use Plan
CRESLI	Coastal Research and Education Society of Long Island
CRIS	Cultural Resource Information System
CTV	crew transfer vessel
cy	cubic yards
CZMA	Federal Coastal Zone Management Act of 1972
dB	decibel(s)
DC	direct current
DMA	Dynamic Management Area
DO	dissolved oxygen
DOER	Dredging Operations and Environmental Research Program
DP	dynamic positioning
DPS	distinct population segment
DPW	Department of Public Works
E1	Subtidal Estuarine Wetlands

E2	intertidal estuarine wetlands
EFH	Essential Fish Habitat
EM&CP	Environmental Management and Construction Plan
EMF	electric and magnetic field(s)
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
ft	feet
FTA	Federal Transit Administration
ft/s	feet per second
G&G	geophysical and geotechnical
GCC	ground continuity conductors
GHG	greenhouse gases
GND	Green New Deal
GSFC	Goddard Space Flight Center
ha	hectare(s)
HAB	horizontal auger boring
HABs	harmful algal blooms
HAP	hazardous air pollutant
HAPC	Habitat Areas of Particular Concern
HDD	horizontal directional drill
HM	high marsh

HRG	high-resolution geophysical survey
HRSA	historic resources study area
HVAC	heating, ventilation, and air conditioning
HYCOM	Hybrid Coordinate Ocean Model
Hz	hertz
IBA	Important Bird Area
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation
ICW	intracoastal waterway
ICW HDD	intracoastal waterway horizontal direction drilling
IEEE	Institute of Electrical and Electronics Engineers
IGRF	International Geomagnetic Reference Field
IHA	Incident Harassment Authorization
IM	intertidal marsh
IMO MARPOL	International Maritime Organization International Convention for the Prevention of Pollution from Ships
in	inch(es)
in/s	inches per second
IPaC	Information for Planning and Consultation
ISMP	Invasive Species Management Plan
ISO	International Organization for Standardization
kHz	kilohertz
km	kilometer(s)
km/s	kilometers per second
kV	kilovolt(s)
L_{10}	sound level exceeded 10 percent of the measurement period

L_{50}	sound level exceeded 50 percent of the measurement period
L_{90}	sound level exceeded 90 percent of the measurement period
L_A	sound level
L_{ANS}	existing sound level
L_{dn}	day-night average sound level
L_{eq}	equivalent continuous sound pressure level
L_W	sound power level
LICAP	Long Island Commission for Aquifer Protection
LIE	Long Island Expressway
LIPA	Long Island Power Authority
LIRR	Long Island Rail Road
LNG	liquefied natural gas
LRWP	Local Waterfront Revitalization Program
LSZ	landscape similarity zone
LZ	littoral zone
m	meter(s)
m^3	cubic meters
m/s	meters per second
MAR	marine archaeological resource
MBES	multibeam echosounding
MDS	map-documented structure
mG	milligauss
mg/L	milligram per liter
MHWL	mean high water line
mi	mile(s)

mL	milliliter(s)
MMPA	Marine Mammal Protection Act
MPN	Most Probable Number
MPTP	Maintenance and Protection of Traffic Plan
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MVR	Monitor Values Report
MW	megatwatt(s)
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NAVD88	North American Vertical Datum of 1988
NCA	National Coastal Assessment
NCEI	National Centers for Environmental Information
NEFSC	NOAA Northeast Fisheries Science Center
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHD	National Hydrography Database
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NLEB	northern long-eared bat
NLCD	National Land Cover Database
nm	nautical mile(s)
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide

NO_x	nitrogen oxide
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	noise sensitive receptor
NYAC	New York Archaeological Council
NYCRR	New York Codes, Rules and Regulations
NYECL	New York Environment Conservation Law
NYISO	New York Independent System Operator, Inc.
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYS	New York State
NYSDAM	New York State Department of Agriculture and Markets
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
NYSHPO	New York State Historic Preservation Office
NYSOGS	New York State Office of General Services
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
NYSPSC	New York State Public Service Commission
NWI	National Wetland Inventory
NWR	National Wildlife Refuge

O_3	ozone
OCS	Outer Continental Shelf
OnCS-DC	Onshore Converter Station-Direct Current
OPA	Offshore Planning Area
OREC	Offshore Renewable Energy Certificate
PABHx	freshwater pond
PAPE	Preliminary Area of Potential Effects
Pb	lead
PCB	polychlorinated biphenyl
PDD	Planned Development District
PFO	palustrine forested wetlands
PLGR	pre-lay grapnel run
PM	particulate matter
ppb	parts per billion
ppm	parts per million
Project	Sunrise Wind New York Cable Project
PSL	New York Public Service Law
PSO	Protected Species Observer
PTM	particle tracking model
PUBHh	unconsolidated bottom wetlands
PV	Plan View
PVC	polyvinyl chloride
R2UBH	riverine wetlands
RCNM	Roadway Construction Noise Model
REV	Reforming the Energy Vision

ROW	right-of-way
RPA	Register of Professional Archaeologists
RTE	rare, threatened, and endangered species
SAV	submerged aquatic vegetation
SC	species of concern
SCDHS	Suffolk County Department of Health Services
SCFWH	Significant Coastal Fish and Wildlife Habitats
SCWA	Suffolk County Water Authority
SEFSC	Southeast Fisheries Science Center
SEP	State Energy Plan
SF_6	sulfur hexafluoride
SGCN	species of greatest conservation need
SGPA	special groundwater protection areas
SIP	State Implementation Plan
SM	coastal shoals, bars and mudflats
SMA	seasonal management area
SO_2	sulfur dioxide
SOV	service operating vessel
SPCC	Spill Prevention, Control and Countermeasure
SPDES	State Pollutant Discharge Elimination System
SPI/PV	Sediment Profile and Plan View Imaging
SPL	sound pressure level
sq km	square kilometer(s)
sq mi	square mile(s)
SR	State Route

SRHP	State Register of Historic Places
SRWEC	Sunrise Wind Export Cable
SRWEC–NYS	Sunrise Wind Export Cable–New York State
SRWF	Sunrise Wind Farm
SSER CMP	South Shore Estuary Reserve Comprehensive Management Plan
SSS	side-scan sonar
SWPPP	Stormwater Pollution Prevention Plan
TJB	transition joint bay
TMDL	total maximum daily load
TS	trout spawning
TSS	total suspended sediment
$\mu g/m^3$	microgram/cubic meter
µ/L	micrograms per liter
µPa	micropascal(s)
UME	unusual mortality event
US	United States
USC	United States Code
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOE	United States Department of Energy
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
VOC	volatile organic compounds
VSA	Visual Study Area
VSR	Visually Sensitive Resource

XLPE	cross-linked polyethylene
WNC	winter normal conductor
yBP	years before present
ZVI	Zone of Visual Influence

EXHIBIT 4: ENVIRONMENTAL IMPACT

In accordance with New York Public Service Law (PSL) § 122 and 16 New York Codes, Rules and Regulations (NYCRR) § 86.5, this exhibit provides a summary of the studies conducted to identify potential impact of the Project on the environment, including a description of the methods used to conduct such studies and a summary of the findings.

4.1 INTRODUCTION

Sunrise Wind LLC (Sunrise Wind or the Applicant), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct, operate, and maintain the Sunrise Wind New York Cable Project (the Project). Sunrise Wind executed a 25-year Offshore Wind Renewable Energy Certificate (OREC) contract related to the Sunrise Wind Farm (SRWF) and the Project with the New York State Energy Research and Development Authority (NYSERDA) in October 2019. The Project will deliver power from the SRWF, located in federal waters on the Outer Continental Shelf (OCS), to the existing electrical grid in New York (NYS). The Project includes offshore and onshore components within NYS that are subject to PSL Article VII review and will interconnect at the existing Holbrook Substation, which is owned and operated by the Long Island Power Authority (LIPA).

Specifically, power from the SRWF will be delivered to the existing mainland electric grid via distinct Project segments: the submarine segment of the export cable (SRWEC), which will be located in both federal and NYS waters (the NYS portion of the cable referred to as the SRWEC–NYS); the terrestrial underground segment of the transmission cable (Onshore Transmission Cable); the new Onshore Converter Station (OnCS-DC); and the underground segment of the interconnection cable (Onshore Interconnection Cable). The Onshore Transmission Cable, the OnCS-DC, and Onshore Interconnection Cable (collectively, the Onshore Facilities) are all located in the Town of Brookhaven, Suffolk County, New York.

The Project's components are generally defined into two categories:

- SRWEC-NYS
    - One direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 6.2 miles (mi) (10 kilometers [km]) in length in NYS waters and up to 1,575 feet (ft) (480 meters [m]) located onshore (*i.e.*, above the Mean High Water Line [MHWL], as defined by the United States [US] Army Corps of Engineers [USACE] [33 Code of Federal Regulations (CFR) 329]) and underground, up to the transition joint bays (TJBs).

- Onshore Facilities
    - One DC underground transmission circuit (320 kV) (referred to as the Onshore Transmission Cable) up to 17.5 mi (28.2 km) in length within existing roadway right-of-way (ROW), TJBs, and concrete and/or direct buried joint bays and associated components;
    - One OnCS–DC that will transform the Project voltage to 138 kV alternating current (AC);
    - Two AC underground circuits (138 kV) (referred to as the Onshore Interconnection Cable) up to 1 mi (1.6 km) in length, which will connect the new OnCS–DC to the existing Holbrook Substation; and
    - Fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable.

For additional information pertaining to the location of the Project facilities, see Revised Exhibit 2: Location of Facilities.

Extensive field investigations, existing data and modeling review, and agency consultations were conducted to identify, describe, and quantify, as appropriate, existing environmental conditions within the Project corridors and within the vicinity of the Project.

Field surveys, which were conducted in 2020 and will continue in spring 2021, assessed physical conditions (*e.g.*, geology, surface waters, benthic resources), biological resources (*e.g.*, vegetation, wetlands, wildlife), and land use (*e.g.*, cultural and historic resources, scenic areas).

Desktop evaluations included, but were not limited to, review of the Suffolk County Soil Survey, aerial photography, United States Geological Survey (USGS) topographic maps, National Wetlands Inventory (NWI) maps, New York State Department of State (NYSDOS) habitat maps, New York State Department of Environmental Conservation (NYSDEC) freshwater wetland maps, NYSDEC-mapped streams, National Hydrography Database (NHD), New York State Historic Preservation Office (NYSHPO) Cultural Resource Information System (CRIS) maps, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) floodplain mapping.

Consultations with local municipalities, federally recognized Native American tribes, and state and federal agencies were conducted through letters, telephone and electronic communication, virtual meetings, and onsite field reviews. These agencies included the New York State Public Service Commission (NYSPSC), New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), NYSDEC, New York Natural Heritage Program (NYNHP), New York State Department of

Transportation (NYSDOT), NYSDOS, New York State Office of General Services (NYSOGS), USACE, United States Environmental Protection Agency (EPA), United States Fish and Wildlife Service (USFWS), United States Coast Guard (USCG), National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), and National Parks Service (NPS). Appendix 1-B – Agency Outreach and Correspondence includes a summary of agency meetings and copies of key correspondence.

This Exhibit summarizes the results of environmental impact studies or evaluations conducted by the Applicant under the following categories:

- Land Use
- Visual and Aesthetic Resources
- Cultural and Historic Resources
- Topography, Geology, Soils, and Groundwater
- Terrestrial Ecology and Wildlife
- Wetlands and Water Resources
- Benthic and Shellfish Resources
- Finfish and Essential Fish Habitat (EFH)
- Marine Mammals and Sea Turtles
- Marine Physical and Chemical Characteristics
- Noise
- Electric and Magnetic Fields (EMF)
- Air Quality

For each environmental impact study undertaken by the Applicant, this Exhibit describes the existing conditions pertinent to the resource studied, the methodologies used in the investigation, the potential environmental effects, if any, of the Project and, where appropriate, mitigation measures designed to avoid or minimize any adverse impacts.

Potential impacts are characterized as direct or indirect–direct impacts are those occurring at the same place and time as the initial cause or action, and indirect impacts are those that occur later in time or are spatially removed from the activity. The anticipated duration of an impact and recovery time following the impact are also described, often qualitatively and in connection to the Project phase. For example, an impact may be described as temporary, and limited to a particular construction activity, with rapid recovery following the cessation of the activity. Alternatively, an impact may be described as existing for the duration of a particular phase, or over the entire life of the Project (*i.e.*, 25 to 35 years).

Upon receipt of all required permits, approvals, and other land rights, and following the completion of all required notifications, the Project corridors will be prepared for construction. All construction activities will be conducted in accordance with any Project Certificate Conditions, the Project Environmental Management and Construction Plan (EM&CP) and Best Management Practices (BMPs), and the Applicant will substantively comply with local laws, as detailed in Revised Exhibit 7: Local Ordinances, and state and federal permitting as detailed in Revised Exhibit 8: Other Filings. Mitigation measures proposed for the Project include stormwater control measures, which will be identified in the Project EM&CP and an approved SWPPP as part of the Project EM&CP. In addition, mitigation measures specific to the environmental impacts detailed in Subsections 4.2 through 4.14 are discussed within each subsection.

4.1.1 Construction Methodology Overview

This subsection generally describes the methodology that will be followed in constructing the Project. A summary of the maximum areas of land disturbance associated with the construction of the Project are provided in Revised Table 4.1-1. Additional information pertaining to design details and construction techniques are included in Revised Exhibit 5: Design Drawings, Revised Exhibit E-1: Description of Proposed Line, Revised Exhibit E-2: Other Facilities, and Revised Exhibit E-3: Underground Construction.

Revised Table 4.1-1. Maximum Disturbance Areas for the Project Components

Parameter	Maximum Area of Disturbance Area a/
SRWEC-NYS	
Construction Disturbance Corridor b/	74 acres (30.0 hectares [ha])
Boulder Clearance c/	22.2 acres (9 ha)
Sand wave Leveling d/	29.6 acres (12 ha)
Secondary Cable Protection e/	1.5 acres (0.6 ha)
Cable Crossing Protection of Existing Cables f/	7.4 acres (2.9 ha)
SRWEC-NYS Landfall	
Landfall Work Area g/ h/	6.5 acres (2.6 ha)
TJB Area (per TJB) i/	0.03 acres (0.0125 ha)
Area of Seafloor Disturbance for HDD Exit Pits g/ j/	61.8 acres (25 ha)
Onshore Transmission/Interconnection Cable Feature	
Temporary Disturbance Width k/	30 ft (9.1 m)
Trench Width	8 ft (2.4 m)
Duct Bank Target Burial Depth (to top of duct bank) l/	3 to 6 ft (0.9 m to 1.8 m)

Parameter	Maximum Area of Disturbance Area a/
Splice Vault Construction Disturbance Area	50 ft x 40 ft (15 m x 12 m)
Splice Vault Burial Depth (from surface to bottom of the vault)	Up to 15 ft (4.6 m)
OnCS-DC	
Area Disturbed During Construction (acres) m/	7 acres (2.8 ha)
Operations Site Area n/	6 acres (2.4 ha)

NOTES:

a/ Disturbances area includes installation of one distinct DC cable bundle.

b/ SRWEC-NYS corridor length x 98 ft (30 m) wide disturbance corridor. Boulder clearance, sand wave leveling, and cable protection will not extend beyond this corridor.

c/ Assumes up to 30 percent of SRWEC-NYS may be cleared by using a boulder plow or grab within the 98 ft (30 m) wide corridor.

d/ Assumes up to 40 percent of SRWEC-NYS may be cleared of sand waves within a 98-ft (30-m) width corridor (SRWEC-NYS corridor length x 0.40 x 98 ft [30 m].

e/ Assumes up to 5 percent of the SRWEC-NYS would require secondary cable protection, which includes cable crossings and cable protection needed for jointing. Secondary protection will be up to 39 ft (12 m) wide (SRWEC-NYS corridor length x 0.05 x 39 ft [12 m]). Includes areas where additional cable protection may be required post-installation.

f/ Assumes up to 3 known crossings and 2 unknowns of the SRWEC-NYS, requiring additional cable protection and a maximum 1.48 acres (0.6 ha) of seafloor disturbance per cable crossing for each distinct export cable.

g/ Post construction, all work areas would be graded and/or backfilled and returned to pre-construction conditions.

h/ The SRWEC–NYS landfall work area (the Landfall Work Area) defines the area within which the indicative work space and ancillary equipment will be sited where the SRWEC–NYS comes ashore. The anticipated area used will be a minimum of 328 ft x 328 ft (100 m x 100 m) within the Landfall Work Area. The work area is inclusive of all Landfall HDD installation activities, including onshore trenching between end of HDD ducts and TJB is included, as well as construction of TJBs and link boxes. Trenching of Onshore Transmission Cable from TJB to ICW Work Area and HDD cable duct stringing activities are not included in this area. Area assumes 328 ft x 328 ft (100 m x 100 m).

i/ 82 ft x 16 ft (25 m x 5 m), not including link boxes or fiber optic cable boxes.

j/ HDD exit pits will be approximately 164 ft x 49 ft x 16 ft (50 m x 15 m x 5 m) in dimension; a maximum of three exit pits will be required for the Project. The area of seafloor disturbance is inclusive of the HDD exit pit and perimeter bund, anchoring area (approximately 1,640 ft x 1,640 ft [500 m x 500 m]) and separation of the HDD exit pits at the seafloor (HDD exit pits will be approximately 328 ft [100 m] apart).

k/ Maximum temporary disturbance width excludes disturbance area for crossing locations and splice vaults.

l/ Duct bank target burial depth with vary based on site-specific conditions and may be deeper in areas of HDD or trenchless crossings.

m/ Limit of disturbance during construction, inclusive of permanent footprint of the OnCS-DC and temporary disturbance.

n/ Permanent footprint of the OnCS-DC.

SRWEC-NYS

Construction activities associated with the SRWEC-NYS will involve seafloor preparation, submarine cable installation, cable protection installation, and vessel anchoring. Preparation of the seafloor for the SRWEC-NYS will generally involve pre-installation surveys, sand wave leveling, and clearance of boulders, debris, and other obstructions along the cable corridor. A pre-lay grapnel run (PLGR) will also be completed to clear the cable corridor of possible obstructions and debris (*e.g.*, abandoned fishing nets, wires, rope, and hawsers) prior to installation.

The submarine cables are expected to be installed using one or more of the following burial techniques (depending on the physical properties of the seafloor and the operating tolerances of the equipment):

mechanical plowing, jet-plowing, pre-cut mechanical plowing, pre-cut dredging, mechanical cutting, or controlled flow excavation (CFE) (see Revised Exhibit E-3: Underground Construction). The depth of disturbance will be limited to the cross-section of the trench cut for cable laying; the target burial depth will be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. Dynamic positioning (DP) vessels will be used for cable installation to the extent feasible; if anchoring (or a pull ahead anchor) is required during cable installation, it will occur within a corridor centered on the cable.

Where the SRWEC–NYS approaches the landfall location, the cables will be installed via horizontal directional drilling (HDD) beneath the intertidal transition zone to the onshore TJBs (the Landfall HDD). The HDD methodology will involve drilling underneath the seafloor and the intertidal area using a drilling rig located onshore in the landfall work area within Smith Point County Park (the Landfall Work Area). No disturbance to the seafloor is expected between the HDD exit point and the shore because the cable will be installed via HDD. Vessels, including a shallow draught barge or jack-up vessel, will be used to support these operations. For the purposes of impact assessment, land disturbance associated with installation of the HDD for the SRWEC–NYS in the Landfall Work Area between the MHWL (as defined by the USACE [33 CFR Part 329]) and the TJBs is described further below, under Onshore Facilities. See Revised Exhibit E-3: Underground Construction for additional details on the SRWEC–NYS HDD installation.

Onshore Transmission Cable

Construction of the Onshore Transmission Cable will involve site preparation, trench excavation, duct bank and vault installation, cable installation, cable jointing, final testing and restoration, with additional steps associated with HDD and other trenchless crossing methods.

Site preparation of the work area associated with the Landfall HDD and where the Onshore Transmission Cable will cross the intracoastal waterway (ICW) via HDD (ICW HDD) (the Landfall and ICW Work Areas) is limited due to their location largely within existing parking lots. The Landfall Work Area will contain HDD activities to support installation of the SRWEC–NYS to the TJBs, where the SRWEC–NYS and Onshore Transmission Cable will be jointed. The ICW Work Area will contain HDD activities to support installation of the Onshore Transmission Cable under the ICW. The Landfall and ICW Work Areas will be returned to pre-existing conditions post-construction. Excavators will be used for excavation of TJBs, and the TJBs will be located underground with access maintained via manhole covers.

The majority of the Onshore Transmission Cable has been sited within the paved portions of existing roadway ROW. The Project will utilize trenchless crossing installation to avoid sensitive environmental resources or other physical obstructions (*e.g.*, major highways, railroads) at certain crossing locations. The trenchless installation(s) will either consist of excavating a pair of pits on either side of a crossing or jacking pipe under a crossing (*e.g.*, railroad).

Outside of sensitive areas, excavators will be used for excavation of both trenchless crossing work areas, splice vault installation, and trenches. Land disturbance associated with this excavation is considered temporary, as these areas will be backfilled and surface conditions restored to pre-existing conditions in coordination with local entities, after construction is completed.

Excavation, grading, and fill along the roadways may require cutting or trimming of vegetation and removal of large rocks from the construction work area to facilitate safe construction. Additional information pertaining to construction techniques to be used to install the Onshore Transmission Cable is provided in Revised Exhibit E-3: Underground Construction.

OnCS–DC

Construction of the OnCS–DC will occur in an industrial area in the Town of Brookhaven. The Union Avenue South Site is located south of Union Avenue in the Town of Brookhaven, this approximately 7-acre (2.8-ha) area includes two parcels to be improved jointly as a common development. For the purpose of the environmental assessment presented in this Application, the Union Avenue South Site is referenced throughout this Application as the "Union Avenue Site". Construction activities for the OnCS–DC, including tree clearing, excavation, grading, and filling, will be conducted, and expected changes to onsite drainage patterns will be addressed during the EM&CP phase of the Project. All earth disturbances from onshore construction activities will be conducted in compliance with the New York State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges associated with Construction Activities and an approved SWPPP as part of the Project EM&CP. Following completion of construction of the OnCS–DC, these areas will be restored to pre-existing conditions post-construction or allowed to revert back to pre-existing conditions where appropriate. Additional information pertaining to design details and construction techniques are included in Revised Exhibit E-2: Other Facilities.

Onshore Interconnection Cable

The majority of the Onshore Interconnection Cable has been sited within the existing roadway and utility-owned or controlled property. Construction of the Onshore Interconnection Cable will involve site preparation, trench excavation, duct bank and vault installation, cable installation, cable jointing, final testing and restoration, with additional steps associated with trenchless crossing methods. Additional information pertaining to construction techniques to be used to install the Onshore Interconnection Cable is provided in Revised Exhibit E-3: Underground Construction.

4.1.2 Operations Overview

During operation of the SRWEC–NYS, potential impacts will be limited to non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection and infrequent anchoring of maintenance vessels along the SRWEC–NYS.

Upon completion of construction activities, the Onshore Transmission Cable and Onshore Interconnection Cable will be installed entirely underground. The SRWEC–NYS, Onshore Transmission Cable, and Onshore Interconnection Cable will require very little maintenance, if any; these components are designed such that inspection and maintenance during operations will not be required unless a fault or failure occurs. Failures are only anticipated in the event of damage from outside influences such as unexpected digs from other parties. Vegetation will be managed to ensure safe operation of, and access to, the Onshore Transmission Cable and Onshore Interconnection Cable, as needed.

The OnCS–DC will be unmanned during routine operations and will be inspected regularly based on manufacturer-recommended schedules. Personnel will be on site as necessary for any maintenance or repairs.

4.2 LAND USE

This section describes existing land uses and zoning within, and within the vicinity of, the Project and evaluates potential impacts to these land uses resulting from the construction and operation of the Project. In addition, land use regulations and policies for Suffolk County and the Town of Brookhaven (and the unincorporated hamlets crossed by the Onshore Transmission Cable), as well as for NYS, have been reviewed to determine the Project's consistency with present or future planned land development. An assessment of the applicability of local ordinances and zoning for Suffolk County and the Town of Brookhaven is provided in Revised Exhibit 7: Local Ordinances.

The land use information provided in this section is based on desktop review of online GIS data sources, aerial imagery, local comprehensive plans, as well as a field "windshield survey" of the Onshore Facilities conducted in July 2020. The Onshore Facilities are wholly located within the Town of Brookhaven. The study area for land use includes 500 ft (152 m) on either side of the SRWEC–NYS and Onshore Facilities (the Land Use Study Area).

4.2.1 Existing Conditions

Land Use

SRWEC-NYS

Existing land uses present within the Land Use Study Area along the SRWEC-NYS are illustrated in generalized land use map provided as Revised Figure 4.2-1.

The SRWEC-NYS will enter NYS territorial waters at a point 3 nautical miles (nm) offshore from Fire Island and traverse NYS waters to the landfall location at Smith Point County Park in the Town of Brookhaven. The SRWEC-NYS will be joined with the Onshore Transmission Cable at the TJBs located at the landfall location within the Landfall Work Area at Smith Point County Park. Smith Point County Park is the largest park owned by Suffolk County and is popular with sportsmen, surfers, general beach visitors, and campers.

Onshore Transmission Cable

Existing land uses present within the Land Use Study Area along the Onshore Transmission Cable are illustrated in Revised Figure 4.2-1.

From the TJBs, the Onshore Transmission Cable will run parallel to Fire Island Beach Road within the paved park parking lot, and will cross under William Floyd Parkway to a designated recreation area located west of William Floyd Parkway. Much of this recreation area is undeveloped and maintained as open lawn, however, a number of basketball, volleyball, and handball courts are present as well as a covered pavilion and a restroom facility. Within this recreational area, the Onshore Transmission Cable will turn to the north/northwest and will then be routed under the ICW in a northwest direction via an ICW HDD, which will extend approximately 0.5 mi (0.8 km) in length to a paved parking lot within the Smith Point Marina. The marina is developed with a boat ramp and 50 parking spots for vehicles with boat trailers.

From the ICW HDD landfall location, the Onshore Transmission Cable will continue northwest through the marina parking lot and then follow the marina access road (East Concourse Drive) north and east to William Floyd Parkway. At William Floyd Parkway, the corridor will extend north within the roadway ROW for approximately 3.6 mi (5.8 km) to its intersection with Surrey Circle where the cable turns to the west.

The approximately 3.6 mi (5.8 km) segment of the Project along William Floyd Parkway is developed with a variety of land uses. Medium density residential is the primary land use present along the western side of the Parkway, with the exception of a portion of the USFWS Wertheim National Wildlife Refuge (NWR) that is adjacent to the Land Use Study Area near the intersection of William Floyd Parkway and Havenwood Drive. Land use is more varied to the east of the Parkway. Medium density residential remains the predominant land use east of the corridor along the southernmost 2.4 mi (3.9 km) of this segment. Other land uses present east of the Parkway include recreation and open space uses, such as a golf course and other recreational and open space present within the Colony Woods residential developments. Limited commercial uses are present. The remaining 1.2 mi (1.9 km) of this segment east of William Floyd Parkway is characterized by commercial uses and medium density residential development. A number of vacant parcels are also present.

At Surrey Circle, the Onshore Transmission Cable will travel west within the roadway's ROW for approximately 0.1 mi (0.2 km) and will continue north along Church Road and will cross under the Long Island Rail Road (LIRR) via trenchless crossing and then turn west onto Mastic Boulevard. The Onshore Transmission Cable will travel west along Mastic Boulevard for approximately 0.2 mi (0.3 km) to the intersection with Francine Place and then turn north on Francine Place for approximately 0.1 mi (1.6 km) to the intersection with Montauk Highway. This segment from Surrey Circle to Montauk Highway is characterized by medium density residential while Montauk Highway near Francine Place is characterized by commercial development. The Onshore Transmission Cable will cross Montauk Highway to Revilo Avenue and will continue north along Revilo Avenue through mixed residential and commercial development for approximately 0.07 mi (0.1 km) to the work area for the Sunrise Highway trenchless crossing. The Onshore Transmission Cable will cross Sunrise Highway via trenchless crossing to Revilo Avenue, continuing north to the intersection with Victory Avenue.

The Onshore Transmission Cable will continue west on Victory Avenue for approximately 2.1 mi (3.4 km) to Horseblock Road, crossing Carmans River via HDD. Victory Avenue is characterized by low density residential from the intersection with Revilo Avenue to River Road. From the intersection of River Road, this segment is characterized by open space, with the Southaven County Park along the northern side and general open space to the south. This segment also falls within the Long Island Central Pine Barrens. The Southaven County Park provides a number of recreational resources, including hiking, camping, fishing, boat rentals, horseback riding, hunting and boating activities on Carmans River.

Between the Onshore Transmission Cable's crossing of the Carmans River and Horseblock Road, land uses along Victory Avenue are predominately low density residential to the north, interspersed with agricultural uses and open space to the south between Victory Avenue and Sunrise Highway.

At Horseblock Road, the Onshore Transmission Cable will turn to the northwest and continue for approximately 3.2 mi (5.1 km) to Manor Road. Horseblock Road along this segment is developed primarily with industrial uses and to a lesser extent, undeveloped vacant land. Commercial uses are also present, but are more common along Horseblock Road west of its crossing of East Patchogue Yaphank Road/Sills

Road (County Route 101). Notable land uses present along this segment include the Town of Brookhaven Landfill and the Rosemont Brookhaven Apartment Complex, both located south of the corridor between Yaphank Avenue and East Patchogue Yaphank Road/Sills Road.

The Onshore Transmission Cable will turn north onto Manor Road and continue north for a distance of approximately 800 ft (0.2 km) to Long Island Avenue. Along this segment, the corridor will cross the main line of the Ronkonkoma Branch of the LIRR, utilizing trenchless construction methods. Land uses present along Manor Road include LIPA's West Yaphank Substation to the west, a school bus depot, an airport shuttle service, and private busing company are located adjacent to the east. North of the crossing of the LIRR ROW, the Onshore Transmission Cable will be located within an undeveloped portion of Manor Road ROW to its intersection with Long Island Avenue.

At Long Island Avenue, the transmission corridor will turn west and travel a distance of approximately 675 ft (206 km) to reach the North Horseblock Road on-ramp where it will extend an additional approximately 1,600 feet to reach the Long Island Expressway (LIE) South Service Road. Vacant land and low-density residential and commercial land uses are present to the north of the corridor along this portion of the Onshore Transmission Cable. Undeveloped ROW associated with Horseblock Road is located to the south. The Onshore Transmission Cable will be routed west along the South Service Road for approximately 3.8 mi (6.1 km) to Waverly Avenue (County Route 61). The predominant land use present along the South Service Road is low-density residential followed by vacant land. The Onshore Transmission Cable will turn south at the intersection of the South Service Road and Waverly Avenue and travel south within the Waverly Avenue ROW for a distance of approximately 0.4 mi (0.6 km) where the corridor will turn west onto Long Island Avenue. Medium-density residential is the predominant land use with commercial land uses present near the intersection of Long Island Avenue and Waverly Avenue. The corridor will continue west along Long Island Avenue for approximately 0.9 mi (0.1 km) to Union Avenue where it will reach the site of the OnCS-DC.

OnCS-DC

As described in Revised Exhibit 3, the Applicant evaluated several locations for the OnCS-DC based on parcel availability, environmental resources, land use, zoning, distance to shore, design requirements, and construction feasibility. The Union Avenue South Site was ultimately selected as the location for the OnCS-DC, and as previously indicated is referenced throughout this application as the "Union Avenue Site".

Located on the south side of Union Avenue in the Town of Brookhaven, this 7-acre (2.8-ha) site is located on two parcels to be improved jointly as a common development and is currently the location of a building supplier (Island Building Supply, Inc.) and two construction companies (Pratt Brother's Inc. and Ferreira Construction). The site is bound to the north by Union Avenue, with NYPA's Richard M. Flynn Power Plant and National Grid's LNG facility located north of Union Avenue; to the east by a chemical distribution facility (Pride Chemical Solutions, Inc.); to the south by a LIRR ROW with an asphalt and concrete production facility (Prima Asphalt & Concrete Inc.) located south of the LIRR; and to the west by industrial development (Northville Industries Holtsville oil storage terminal). This site is located in the Town of Brookhaven's L1 zoning district. This site is currently cleared and contains gravel and paved locations, multiple buildings, and equipment storage areas associated with the current site operations mentioned above.

The Project is in discussion with the owners regarding acquisition or lease of the property for the Project.

Construction of the OnCS-DC is anticipated to result in approximately 7 acres (2.8 ha) of disturbance, inclusive of permanent footprint and temporary disturbance, with the final operations site approximately 6 acres (2.4 ha) in size.

Onshore Interconnection Cable

The Onshore Interconnection Cable from the OnCS-DC will begin at a set of termination structures located along the northerly portion of the Union Avenue Site and will be routed along Union Avenue to an existing utility-owned or controlled property for connection to the Holbrook Substation. Routing to the existing Holbrook Substation will require a trenchless crossing of the LIE (I-495). Existing land use development present along Onshore Interconnection Cable is primarily industrial, including utilities.

A detailed inventory of existing land use present within the Land Use Study Area is provided in Revised Table 4.2-1.

Revised Table 4.2-1. Existing Land Use within the Land Use Study Area

Area Present within Land Use Study Area (500-ft)					
Land Use	SRWEC-NYS (acres)	Onshore Transmission Cable (acres)	Union Avenue Site (acres)	Onshore Interconnection Cable (acres)	Approximate Total (Percent)
Low Density Residential	0	62.6	0	0	2.9
Medium Density Residential	0	318.9	0	14.4	15.4
High Density Residential	0	71.2	0	0.5	3.3
Commercial	0	145.2	0	7.5	7.1
Industrial	0	166.4	29.6	23.2	10.1

Area Present within Land Use Study Area (500-ft)					
Land Use	SRWEC-NYS (acres)	Onshore Transmission Cable (acres)	Union Avenue Site (acres)	Onshore Interconnection Cable (acres)	Approximate Total (Percent)
Institutional	0	27.4	0	0	1.3
Recreation and Open Space	49.3	237.6	0	0.1	13.3
Agricultural	0	7.8	0	0.1	0.4
Vacant	0	222.8	0	0.8	10.3
Transportation	0	43.0	2.3	3.9	2.3
Utilities	0	26.7	16.9	87.1	6.0
Waste Management	0	42.4	0	0	2.0
Surface Waters	516.5	39.4	0	0	25.7
				Total	100
SOURCE: Suffolk County Department of Economic Development & Planning 2016					

Zoning

Zoning information was obtained for the Town of Brookhaven via the Suffolk County Department of Economic Development and Planning. Revised Figure 4.2-2 and Revised Table 4.2-2, below, summarizes the existing Town of Brookhaven zoning districts present within the Land Use Study Area along the SRWEC-NYS and Onshore Facilities. Areas shown within the Land Use Study Area that are not designed with a specific zoning district fall within the Town of Brookhaven's Residential Districts (A10, A5, A2, A1, A, B1, B, C, D or RD). In accordance with § 85-136 of the Town of Brookhaven Zoning Code, all lands under water within the Town of Brookhaven that are not shown on the Official Township Zoning Map (*i.e.*, Building Zone Map) as specifically included within a district, or any other property that has not been specifically included within a zoning district, shall be classed as lying and being within the boundaries of the A Residence 1 District.

Revised Table 4.2-2. Zoning Summary

Zoning District	Percent Coverage within Land Use Study Area (500-ft)			
	SRWEC-NYS (Percent)	Onshore Transmission Cable (Percent)	Union Avenue Site (Percent)	Onshore Interconnection Cable (Percent)
Residential Zoning/Roads	100	76.0	5.9	41.3
AA	0	0.2	0	0
CA	0	0.1	0	0

Zoning District	Percent Coverage within Land Use Study Area (500-ft)			
	SRWEC-NYS (Percent)	Onshore Transmission Cable (Percent)	Union Avenue Site (Percent)	Onshore Interconnection Cable (Percent)
IND1	0	1.2	27.4	0
J2	0	5.5	0	1.9
J4	0	0.6	0	0
J5	0	0.5	0	0
L1	0	16.1	52.5	49.6
L2	0	0.1	14.2	7.2

SRWEC-NYS

As detailed in Revised Table 4.2-2 and illustrated on Revised Figure 4.2-2, upon landfall at Smith Point County Park, the SRWEC-NYS will be located within the Residential District (Fire Island).

Onshore Transmission Cable

As detailed in Revised Table 4.2-2 and illustrated on Revised Figure 4.2-2, residential zoning districts comprise the majority of zoning districts located within the Onshore Transmission Cable Land Use Study Area. Commercial zoning districts, while located throughout the Land Use Study Area, are most common on William Floyd Parkway near its intersection with Montauk Highway. Commercial zoning districts are also present along the South Service Road, clustered at the LIE off-ramps (Exits 64 and 65). Industrial zoning (L Industrial 1), is the primary zoning district along the segment of the Onshore Transmission Cable located along Horseblock Road, although residential zoning is also present along the southern side of Horseblock Road, west of Yaphank Road. In addition, L Industrial 1 Zoning Districts are present on Long Island Avenue near its intersection with Waverly Avenue, and J Commercial 2 zoning is also present along the roadway near Waverly Avenue. West of Waverly Avenue along Long Island Avenue, zoning within the Town of Brookhaven is exclusively industrial, with L Industrial 1 being the common zoning district. A single L Industrial 2 zoning district is also present at the western end of the Land Use Study Area, south of Union Avenue.

The Onshore Transmission Cable Land Use Study Area will overlap with the Town of Islip municipal boundary, south of Long Island Avenue and west of Waverly Avenue. Industrial zoning (IND 1) is the predominant zoning district present in the Town of Islip within Land Use Study Area.

OnCS-DC

The Union Avenue Site is located within the L Industrial 1 zoning district. The purpose of the L Industrial 1 Zoning District is to accommodate a wide range of light industrial, which can meet a high level of performance standards.

An assessment of the applicability of local ordinances and zoning for Suffolk County and the Town of Brookhaven to the siting of the OnCS-DC is provided in Revised Exhibit 7: Local Ordinances.

The OnCS-DC Land Use Study Area will overlap with the Town of Islip municipal boundary, south of the Union Avenue Site. Industrial zoning (IND 1) is the predominant zoning district present in the Town of Islip within the Land Use Study Area.

Onshore Interconnection Cable

Industrial zoning (L Industrial 1), is the primary zoning district along the Onshore Interconnection Cable.

Land Use Policies

Within the Town of Brookhaven, the SRWEC-NYS and the Onshore Facilities traverse a number of special planning areas and hamlets, an unincorporated community that is governed at-large by the town it is in, that also have their own land use planning documents. Revised Table 4.2-3 address the NYS, county, local, and community land use plans applicable to the Project.

Revised Table 4.2-3. Applicable Land Use Plans

Land Use Plan	Brief Description of Land Use Plan	Compliance
NYS Land Use Plans		
2016 New York State Open Space Conservation Plan	The 2016 New York State Open Space Conservation Plan (Open Space Conservation Plan) (NYSDEC et al. 2016) was developed with the overall intent to conserve open space, protect ecosystems, and preserve a sustainable quality of life, while also providing for future environmental and recreational benefits on public lands in NYS. This Plan offers various comprehensive recommendations, and Statewide strategies to encourage NYS and local governments, as well as nonprofit organizations, to achieve these conservation goals. The Plan divides NYS into nine NYSDEC administrative Regions; Long Island is identified as Region 1. There are 140 regional priority conservation projects across NYS, the following can be viewed as potentially applicable to the Onshore Transmission Cable: Project 1: Atlantic Coast – Acquisition of coastal parcels for active and passive recreation, habitat and endangered species protection, coastal resiliency and mitigation of the effects of sea-level rise due to climate change. Representative projects potentially applicable to the Onshore Transmission Cable identified within the plan under the Atlantic Coast Project include: Barrier Islands: Parcels on Fire Island and the south shore that are susceptible to erosion and flooding from wave action storm surge (at p. 81). Project 2: Central Pine Barrens - Acquisition of vacant land within the legislatively designated boundary of the Central Pine Barrens (New York Environmental Conservation Law [NYECL] § 57-0101(11). Available, privately-owned parcels within the Core Preservation Area (CPA) should be acquired, as well as select projects in the Compatible Growth Areas (CGA). Representative projects potentially applicable to the Onshore Transmission Cable identified within the plan under the Central Pine Barrens Project include: Carmans River Watershed: Parcels within the newly expanded Central Pine Barrens legislative boundary that now encompasses the Carmans River Watershed consistent with the Town's "Carmans River Conservation and Management Plan" (at p. 81). Project 5: South Shore Estuary Reserve – Acquisition of open space within the boundaries of the NYS-designated South Shore Estuary Reserve, a 326-square-mile area encompassing south shore bays and their watersheds, for coastal resiliency, mitigation of sea-level rise, water quality and habitat protection, public waterway access and preservation of historic, cultural and maritime resources. Representative projects potentially applicable to the Onshore Transmission Cable identified within the plan under the South Shore Estuary Reserve Project include:	The development of the Project does not conflict nor will it otherwise preclude the implementation of the projects identified within the 2016 NYS Open Space Conservation Plan that are potentially applicable to the routing of the Project. The SRWEC–NYS will be located underwater, and the Onshore Transmission Cable and Onshore Interconnection Cable will be located underground, primarily in existing roadway and utility ROWs, and as a consequence, will not affect public access to or limit improvements to existing preserved open space, agricultural land, wildlife management areas, trails and greenways or affect scenic, recreational and historic areas. Further, development of the Project will not preclude acquisition of additional open space as identified in the plan or the designation of new natural, cultural, and recreational resources. HDD will be employed to protect surface water crossings, including the Landfall on Smith Point County Park, the ICW, and Carmans River and their adjoining wetlands that are located within the Central Pine Barrens area, and to reduce the need for the clearing of forested areas and additional disturbances, as discussed further in Section 4.7. The HDD entry and exit pits will be located within the existing road ROW and parking lots to the extent practicable. As detailed elsewhere in this Exhibit, minimal disturbance is expected on wetlands, wildlife, and terrestrial and marine ecology resources as a result of the Project siting the majority of the proposed facilities within existing ROW. Where unavoidable, impacts to these resources will be temporary construction impacts that would be localized and cease once construction is complete. All construction will be completed in accordance with the BMPs and associated requirements contained within the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP.

Land Use Plan	Brief Description of Land Use Plan	Compliance
	Mastic-Shirley Conservation Area: Assemblage of small lots in a 500-acre wetland complex on the Great South Bay. Exceptional habitat as well as critical flood protection to the low-lying communities of Mastic, Mastic Beach, and Shirley in the 100-year floodplain (at p. 84). Project 7: Trails and Greenways - Acquisition of land along foot, bike, and equestrian trails and greenways, to provide non-motorized travel corridors for people and wildlife and to link recreational, natural and cultural attractions. Representative projects potentially applicable to the Onshore Transmission Cable identified within the plan under the Trails and Greenways Project include: Glacial Ridge Trail: Linkage and buffer parcels along this 5-mile trail, which runs east-west along the Ronkonkoma terminal moraine between Brookhaven Town Hall and public land on the Carmans River (at p. 86). Shore-to-Core-to-Shore Trail: Land and easements to complete this north-south trail from the Long Island Sound to the Great South Bay Terrells River County Preserve, linking several NYS and county preserves along the way (at p. 86). Project 133: State Forests, Unique Areas, and Wildlife Management Areas Protection – This Statewide project acknowledges the importance of NYS Forests, Unique Areas, and Wildlife Management Areas that provide valuable natural, cultural and recreation resources enjoyed by millions of visitors each year. The project identifies that protection and enhancement of these resources as critical to their long-term stewardship. It also notes the importance of improvement of access, elimination of in-holdings and provision of buffers to protect these areas and to enhance recreational and cultural opportunities (at p. 155). Project 134: Riparian Buffers, Coastline and Wetland Protection – This Statewide project is aimed at reducing the impacts of storms, storm surges, and flooding in human and natural communities. It calls for enhanced open space conservation programs and strategies that focus on protecting wetlands, floodplain forests, and coastlines as a first line of defense to protect adjacent private property and communities from increased storm intensity, flooding, and rising sea level (at p. 156). Project 137: State Park and State Historic Preservation – This Statewide project acknowledges the importance of NYS Parks and Historic Sites in providing valuable natural, cultural, and recreational resources enjoyed by millions of visitors each year. It calls for improving access, protecting viewsheds, eliminating in-holdings and provision of buffers to protect these areas and to enhance recreational and cultural opportunities (at p. 157). Project 138: Statewide Farmland Protection - This Statewide project identifies farmland protection as a critical component of NYS's overall efforts to conserve open space and acknowledges agricultural land's role in providing fresh produce, scenic open space, vital wildlife habitat, and the economic backbone to many communities (at p. 157). Project 140: Statewide Small Projects – This project includes nine sub-categories of small projects within the following categories:	Further discussion of potential impacts to groundwater and surface quality, terrestrial ecology and wildlife, wetlands and aquatic resources, and aquatic ecology can be found in Sections 4.5, 4.6, 4.7, and 4.8, respectively. The OnCS-DC will be sited on previously disturbed industrial parcels. Section 4.3 discusses the Project's minimal impact on visual and aesthetic resources. Section 4.4 discusses potential Project impacts on cultural, historic, and archaeological resources in proximity to the Project location. The need for enhanced resiliency measures through enhanced open space conservation is a major theme of the Plan. The Project will support a clean, renewable source of energy as an alternative to the burning of fossil fuels that produce greenhouse gas emissions, which will assist in combatting climate change in accordance with NYS's Climate Leadership and Community Protection Act (CLCPA). Accordingly, the Project will be consistent with the 2016 NYS Open Space Conservation Plan.

Land Use Plan	Brief Description of Land Use Plan	Compliance
	Public Fishing Stream and River Access Projects: Provide access for angling through easements along rivers and streams. Waterway access: Provide access to NYS water for boating activities, including canoeing and kayaking. Rare Habitats: Protects habitats for rare plants or animal species or rare natural communities. Historic and Archaeological Resources: Protect historic and archaeological resources that are eligible for listing or are listed on the State or National Register of Historic Places (S/NRHP). Stream Buffer Easements: Provide for maintenance of stream buffers to protect water quality and wildlife habitat. Important Bird Areas (IBA): Provide protection through acquisition or easement for areas designated by the Audubon Society as Important Bird Areas (at pps.162-163).	
2015 New York State Energy Plan	In 2015, NYS released the State Energy Plan (SEP) to advance the "Reforming the Energy Vision" (REV) agenda. REV, launched in 2014, is a comprehensive energy strategy that strives to make energy more affordable, build a more resilient energy system, improve existing initiatives and infrastructure, create jobs and business opportunities and protect the environment. The SEP, as a roadmap for REV, encourages cooperation between government and industries in developing public-private partnerships to foster economic prosperity and environmental stewardship. Included within the SEP are initiatives that will help guide NYS in achieving its clean energy goals: 40% reduction in greenhouse gas emissions from 1990 levels by 2030 50% of electricity must come from renewable sources by 2030 (50 X 30) 23% reduction in energy consumption of buildings from 2012 levels by 2030 On December 18, 2019, the NYS Energy Planning Board approved issuing a Draft Amendment to the 2015 SEP to address NYS's Green New Deal (GND) and new CLCPA, both of which place NYS on a path toward carbon neutrality. The CLCPA sets a requirement for 9,000 megawatts (MW) of offshore wind by 2035.	The Project will be consistent with the 2015 SEP as it supports the development of offshore wind, a renewable energy resource, by providing the needed offshore wind electric transmission and interconnection infrastructure to connect the SRWF to the NYISO Grid. Accordingly, the Project will help NYS achieve the aggressive clean energy goals set forth in the 2015 SEP, in furtherance of REV and the CES policies, and the more recent energy policy established by the GND and CLCPA.
New York State Coastal Zone Management Program	The Federal Coastal Zone Management Act (CZMA) of 1972 was enacted to support and protect the distinctive character of the waterfront and to set forth standard policies for reviewing proposed development projects along coastlines. The program responded to municipal, state, and federal concerns about the deterioration and inappropriate use of the waterfront. The CZMA emphasizes the primacy of state decision-making regarding the coastal zone. In accordance with the CZMA, in 1981 NYS enacted Article 42 of the Executive Law, the Waterfront Revitalization of Coastal Areas and Inland Waterways Act, and in 1982 adopted its own Coastal Management Program (CMP) containing 44 policies designed to balance economic development and preservation by promoting waterfront revitalization and water-dependent uses.	The Project will be in compliance with the NYS CMP, as further detailed in Appendix 4-A – Consistency with New York State Coastal Management Program Policies.

Land Use Plan	Brief Description of Land Use Plan	Compliance
	Article 42 also enables local communities to adopt their own Local Waterfront Revitalization Programs (LWRP), with policies adapted to meet local needs. The Town of Brookhaven does not have an adopted LWRP.	
Wild, Scenic and Recreational Rivers Program	NYS' Wild Scenic and Recreational Rivers Act protects rivers within NYS that have been determined to provide scenic, ecological, recreational, historic, and/or scientific values. Protection to such rivers is granted to preserve designated rivers in a free flowing condition, protecting them from improvident development and use in order to preserve the enjoyment and benefits derived from these rivers for present and future generations. The Carmans River from the Sunrise Highway to the Great South Bay is designated as a Recreational River.	The Project will cross the Carmans River using HDD and therefore avoid direct impacts to the waterway and associated riparian corridors. As a consequence, the required river crossing will not impede or otherwise affect existing river flows. Further, the Project will not alter recreational or other land uses surrounding the river. Accordingly, the Project will be in compliance with the NYS Wild Scenic and Recreational Rivers Act. The Act also states that public utility uses that are subject to Article VII, such as this Project, are allowed without a permit.
Regional/County Land Use Plans		
Long Island South Shore Estuary Reserve Comprehensive Management Plan	The Long Island South Shore Estuary Reserve Act was passed in 1993 to protect the estuary along the South Shore of Long Island. The Act established the South Shore Estuary Reserve Council, comprised of members from each of the towns and villages along the South Shore of Long Island, which was tasked to develop the Long Island South Shore Estuary Reserve Comprehensive Management Plan (SSER CMP). The SSER CMP provides recommendations for actions to be implemented in order to improve and maintain water quality; protect and restore living resources; expand public use and enjoyment; sustain and expand the estuary economy, and; increase education, outreach, and stewardship. The South Shore Estuary Reserve extends 75 mi east from the Nassau County/New York City line to the Village of Southampton in Suffolk County. From south to north, the Reserve extends from the mean high tide line on the ocean side of the barrier island to the inland limits of the drainage areas. The barrier islands along the Atlantic Ocean, the estuary's shallow interconnected bays and tidal tributaries provide highly productive habitats that support the largest concentration of water-dependent businesses in the NYS. Water quality in the estuary is crucial to the health of the commercial and recreational fishing and shellfishing industries.	The majority of the Project will be located within the Long Island South Shore Estuary Reserve area, and will be in compliance with the SSER CMP. As detailed elsewhere in this Exhibit, minimal disturbance is expected to groundwater and surface water quality, wetlands, wildlife, and terrestrial and marine ecology resources as a result of the Project siting the majority of the proposed facilities within existing ROWs. Where unavoidable, impacts to these resources will be temporary construction impacts that will be localized and cease once construction is complete. Further, the use of HDD for the SRWEC-NYS Landfall will minimize impacts to the barrier island and to cross the ICW will further minimize impacts by avoiding in-water activities within Great South Bay. All construction will be completed in accordance with the BMPs and associated requirements contained within the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP. Further discussion of potential impacts to groundwater and surface quality, terrestrial ecology and wildlife, wetlands and water resources, and aquatic ecology and marine physical and chemical characteristics can be found in Sections 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.
Central Pine Barrens Comprehensive Land Use Plan	The Long Island Pine Barrens Protection Act, established in 1993, established the Central Pine Barrens Joint Planning & Policy Commission to develop a	The Project will traverse the Central Pine Barrens proximate to Victory Avenue.

Land Use Plan	Brief Description of Land Use Plan	Compliance
	comprehensive management plan to protect the Central Pine Barrens of Long Island. The Central Pine Barrens Comprehensive Land Use Plan (CPB CLUP) provides recommendations for development and land uses within the Central Pine Barrens. The Central Pine Barrens is divided into two different zones depending on the designated level of protection. These zones include the Core Preservation Area (CPA), in which development is strictly prohibited, and the CGA, in which planned development is allowed, but controlled.	The Onshore Transmission Cable will be located within the Central Pine Barrens for the segment located along Victory Avenue. Where the corridor crosses the Carmans River it will be located within the CPA. Proximate to Victory Avenue, the Onshore Transmission Cable will be located within the developed ROW of the highway, with the exception of the crossing of the Carmans River, where HDD will be employed along the north side of Victory Avenue to protect the waterbody and its adjoining wetlands. To the extent practicable, the Project will comply with the goals and objectives of the Long Island Pine Barrens Protection Act. See Revised Exhibit 7: Local Ordinances for a more detailed discussion.
Suffolk County Comprehensive Master Plan 2035 – Framework for the Future	The Suffolk County Comprehensive Master Plan 2035: Framework for the Future (Suffolk County 2035 Plan), adopted in 2015, represents the final part of a planning effort that was initiated in 2011 with the publication of an inventory of data relating to demographics, the economy, and quality of life in Suffolk County. The Suffolk County 2035 Plan is guided by three themes: revitalizing the economy; rebuilding downtowns and infrastructure; and reclaiming the quality of groundwater, surface water, and terrestrial resources. The plan identifies priorities such as economic development, environmental protection, transportation, housing diversity, public safety, and energy usage. A key policy area in the Suffolk County 2035 Plan is the encouragement of the development of renewable energy, greening of public infrastructure, and cooperation with local energy utilities in order to protect the environment and enhance human capital.	The development of the Project does not conflict, nor will it otherwise preclude, the implementation of the economic development, environmental protection, transportation, housing diversity, public safety, and energy policies contained within the Suffolk County 2035 Plan. As to environmental protection, the Project has been designed to be protective of the environment to the maximum extent practicable. The Project will be primarily located within existing, disturbed roadway ROW, thereby avoiding most potential environmental impacts. At the crossings of the ICW and Carmans River, HDD will be employed to protect surface waterbodies and their associated wetlands, where present. As detailed elsewhere in this Exhibit, minimal disturbance is expected to groundwater and surface water quality, wetlands, wildlife, and terrestrial and marine ecology resources as a result of the Project siting the majority of the proposed facilities within existing ROWs. Where unavoidable, impacts to these resources, will be temporary construction impacts that would be localized and cease once construction is complete. With respect to energy policy, the Project will support the development of offshore wind, a renewable energy resource, by providing the electric transmission and interconnection infrastructure to connect the SRWF to Long Island's existing electric utility infrastructure.

Land Use Plan	Brief Description of Land Use Plan	Compliance
		Accordingly, the Project will be in compliance with the Suffolk County Comprehensive Master Plan 2035.
Suffolk County Agricultural and Farmland Protection Plan	In 2015, Suffolk County adopted the Suffolk County Agricultural and Farmland Protection Plan which addresses challenges and concerns of farmers in the County and proposes actions to combat agricultural loss from development or environmental degradation.	The Project will be located in proximity to, but is not located in, agricultural lands protected under the Plan. The Onshore Transmission Cable and Onshore Interconnection Cable have been designed to be protective of the environment to the maximum extent practicable and will be primarily located within existing, disturbed roadway and utility ROW, thereby avoiding most potential environmental impacts. The Project will not cross agricultural districts, shellfish cultivation zones, or aquaculture lease sites, and will not propose any changes of existing agricultural land uses. Along the segment on Victory Avenue, where the Onshore Transmission Cable will be located within the roadway ROW, the Project will be located adjacent to, but will not impact, one designated Agricultural District (SUFF003) established under Article 25-AA of the Agricultural and Markets Law of New York State. As the Project will not impact existing agricultural lands, designated shellfish cultivation zones, aquaculture lease sites, and will not preclude the future development of these resources, the Project is in compliance with this Plan.
Suffolk County Comprehensive Water Resource Management Plan	In 2015, Suffolk County adopted the Suffolk County Comprehensive Water Resource Management Plan to address water quality concerns across the County. The Plan outlines goals and objectives to protect and improve local groundwater resources, drinking water supplies, and surface water resources. The Plan specifically identifies recommendations to reduce and control nonpoint source pollution and further degradation of the South Shore Estuary Area, including the Great South Bay.	The Project will be protective of local groundwater resources, drinking water supplies, and surface water resources. No hazardous substance storage is proposed for the Onshore Transmission Cable and Onshore Interconnection Cable, nor will these cables contain lubricants, liquids, or oils. A cross section of a typical cable is included within Revised Exhibit 5: Design Drawings. Electrical equipment will be sited at the OnCS–DC that will contain mineral oils, which will be mounted on concrete foundations with concrete secondary containment design in accordance with industry and local utility standards. Stormwater at the OnCS–DC will be designed in accordance with all NYS and local requirements, and it is anticipated that stormwater discharge from secondary containment basins will be in accordance

Land Use Plan	Brief Description of Land Use Plan	Compliance
		with the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP. Minimal disturbance is expected to groundwater and surface water quality as a result of the Project. All construction will be completed in accordance with the BMPs and associated requirements contained within the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP. Implementation of the BMPs contained within these documents will minimize the potential for impacts associated with erosion and sedimentation. Further discussion of potential impacts to groundwater and surface quality, terrestrial ecology and wildlife, wetlands and water resources, and aquatic ecology and marine physical and chemical characteristics can be found in Sections 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.
Local Land Use Plans		
Town of Brookhaven Comprehensive Land Use Plan	The Town of Brookhaven Comprehensive Land Use Plan was adopted in 1996. It places emphasis on appropriate economic development together with preservation and protection of natural and community resources. For purposes of development of the plan, the Town of Brookhaven was divided into hamlets or groups of hamlets. Recommendations in hamlet plans were adopted and incorporated into the 1996 Comprehensive Plan. The Onshore Transmission and Interconnection Cable corridors traverse the following hamlets study areas addressed within the comprehensive plan: Mastic, Mastic Beach, and Shirley Tri-Hamlet study area, Brookhaven/South Haven Hamlet study area, and Medford study area. In regards to environmental resources, the land use plan provides specific recommendations to address “special environmental areas” in the Town of Brookhaven. The Plan designates the following Special Environmental Areas: Central Pine Barrens Special Groundwater Protection Area (SGPAs)/Hydrogeologic Zones. SGPAs are defined within the comprehensive plan as regions of the Town that lie over significant, sensitive portions of the deep recharge aquifer’s Hydrogeologic Zones I and III. These areas were granted special protection under Article 55 of the NYECL to ensure continued protection of the general high purity and potability of the underlying groundwater supply and ensure a sufficient supply in the future. Wild, Scenic, and Recreational Rivers. Long Island Sound Estuary. South Shore Estuary Reserve.	The Project will be in compliance with the Town of Brookhaven Comprehensive Land Use Plan. The Project will not adversely impact future land use development within the Town of Brookhaven or otherwise preclude implementation of the land use and economic development policies set forth in the comprehensive plan. The Project will also not adversely affect the special environmental areas discussed within the plan. The Project will be primarily located within existing, disturbed roadway ROW, thereby avoiding most potential environmental impacts. The Onshore Transmission Cable will be located within the Central Pine Barrens for the segment along Victory Avenue. Where the corridor crosses the Carmans River it will also be located within the CPA. The Carmans River at this location is a NYS-designated Recreational River. HDD will be employed to protect surface water crossings, including the ICW and Carmans River and its adjoining wetlands that are located proximate to the Central Pine Barrens, and to reduce the need for clearing and additional disturbances, as discussed further in Section 4.7.

Land Use Plan	Brief Description of Land Use Plan	Compliance
	Peconic River Estuary.	A portion of the Onshore Transmission Cable, generally west of Sills Road to Blue Point Road, will be located within Deep Recharge Area Zone III. The Onshore Transmission Cable will not contain lubricants, liquids, or oils that would pose a hazard to the underlying aquifer. The OnCS-DC and Onshore Interconnection Cable are located outside of Zone I and III deep recharge areas. The Project will not be located within the Long Island Sound or Peconic River Estuaries. The majority of the Project will be located within the Long Island South Shore Estuary Reserve area. As detailed elsewhere in this Exhibit, minimal disturbance is expected to groundwater and surface water quality, wetlands, wildlife, and terrestrial and marine ecology resources as a result of the Project. Impacts to these resources will be temporary construction impacts that will be localized and cease once construction is complete. All construction will be completed in accordance with the BMPs and associated requirements contained within the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP. Further discussion of potential impacts to groundwater and surface quality, terrestrial ecology and wildlife, wetlands and water resources, and aquatic ecology and marine physical and chemical characteristics can be found in Sections 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.
Carmans River Conservation and Management Plan	In October 2013, the Town of Brookhaven Town Board adopted the Carmans River Conservation and Management Plan in order to assess existing conditions and develop recommendations to mitigate existing impairments and protect the future health of the River. The goals of the Carmans River Conservation and Management Plan are: Environmentally-sensitive lands that are critical to the ecological health and water quality of the Carmans River, or are significant habitats within the Carmans River watershed, should be protected and preserved. There should be no further degradation of water quality in the Carmans River, and a concerted effort should be made to reduce the concentrations of water quality contaminants from their present levels. Any new development or redevelopment in the Carmans River watershed should not adversely impact water quality in the Carmans River or the key ecological communities in the Carmans River watershed.	The Project will be in compliance with the Carmans River Conservation and Management Plan as it has been designed to be protective of the environment and will not conflict with the overriding goals of this plan or preclude the implementation of the plan's recommendations. HDD will be employed at the crossing of the Carmans River to avoid impacts to the River and its adjoining wetlands and associated ecological communities. The Onshore Transmission Cable will not contain lubricants, liquids, or oils that would pose a hazard to water quality within the waterway. Potential water quality impacts during construction will be minimized though the implementation of BMPs and associated requirements contained within the SPDES General

Land Use Plan	Brief Description of Land Use Plan	Compliance
	Degraded habitats should be restored, stormwater discharges mitigated, and the abundance of invasive species significantly reduced and, if possible, eliminated. Environmental stewardship, outreach and education should be promoted by the Town of Brookhaven. The Plan resulted in 19 recommendations that were prepared to accomplish the above goals. These recommendations included such topics, among others, as the expansion of the Central Pine Barrens Area, proposed land acquisitions, protection of natural resources, proposed zoning actions within the Study Area and water quality goals for the River. A key component of the Management Plan is the addition of select properties within the Management Plan area to the Central Pine Barrens CPA and CGA.	Permit and the SWPPP prepared as part of the Project EM&CP. These documents will also set forth the BMPs to minimize impacts associated with invasive species. Further, an Inadvertent Return Plan will also be developed as part of the Project EM&CP and implemented during construction to address inadvertent release of drilling fluids. Further discussion of potential impacts to groundwater and surface quality, terrestrial ecology and wildlife, wetlands and water resources, and aquatic ecology and marine physical and chemical characteristics can be found in Sections 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.
2010 Medford Vision Update	The 2010 Medford Vision Update is an update to the 1994 Medford Hamlet Comprehensive Plan establishing development goals and objectives for the future of Medford's major corridors. Five "Opportunity Areas" and a "Focus Area" were established in the plan. Opportunity areas are those parts of Medford that have the most potential for enhancement, and the focus area is the area around the train station that was identified as a potential "Hamlet Center." An approximately 2.5-mile [4.03 km] segment of the Onshore Transmission Cable corridor is located within the Hamlet of Medford. This segment will be generally located along Horseblock Road, north and west of Sills Road (County Route 101), to the South Service Road, where it will turn west along the South Service Road to North Ocean Avenue (County Route 83), the western boundary of the hamlet. From west to east, the Onshore Transmission Cable Corridor Segment with Medford will cross the following "opportunity areas": Opportunity Area 3: Peconic Avenue - Munsells Road Industrial Area. Plan recommendations for this area include zoning amendments to require the incorporation of additional street front landscape and vegetative buffer requirements for industrial uses, strict enforcement of existing noise ordinance; and route restrictions for industrial truck traffic over 10,000 lbs. Opportunity Area 2 – South Service Road to Long Island Avenue. East of SR 112 to Horseblock Road. Recommendations for this zone include the potential for a "cluster development" for multifamily residential and/or corporate campus uses that incorporate recreational opportunities (bikeway, trails, pocket par) along with sidewalk improvements. Zoning changes would be required to support the recommended development. Opportunity Area 1 - SR 112 - Hotel Shopping Center Area. Recommendations for building façade, landscape, streetscape, signage improvements, and pedestrian enhancements are identified within the plan for this area. No changes in zoning are recommended for this area.	The Project will be in compliance with the 2010 Medford Vision Update The Project will not adversely impact future land use development within the Hamlet or otherwise preclude implementation of the recommendations set forth for the Focus Area and Opportunity Areas discussed within the plan.
A Community-Based Vision and Revitalization Plan for	A review of the land uses around Mastic Road and Neighborhood Road and recommendations to promote efficient and productive commercial development in those areas.	The Onshore Transmission Cable will be installed below grade within the existing ROW along the William Floyd Parkway, and the roadway will be restored upon

Land Use Plan	Brief Description of Land Use Plan	Compliance
Neighborhood Road and Mastic Road, Mastic Beach	The Onshore Transmission Cable will traverse the western edge of the "Neighborhood Road Study" area, whose western boundary is the William Floyd Parkway. The vision established by the community for the Neighborhood Road Study area is to "provide a gateway and park at the intersection of Havenwood Road and William Floyd Parkway, revitalize the appearance of the downtown businesses and improve recreational opportunities at the Bayview Park property." To accomplish this vision the plan recommends the establishment of a Planned Development District (PDD) within the Neighborhood Road Study area to provide "increased flexibility to achieve desired development with more creative and imaginative designs of residential, mixed-use and commercial projects than is presently achievable using conventional land use regulations."	completion of the cable installation in coordination with Suffolk County Department of Public Works (DPW). Therefore, the development of the Project does not conflict nor will it otherwise preclude the implementation of the recommendations for the Neighborhood Road Study area as contained within the vision and revitalization plan.

Floodplains

The FEMA is responsible for flood hazard mapping to assess flood risk to infrastructure and guide mitigative actions. As described in Revised Table 4.2-4 and depicted in Revised Figure 4.2-3, a review of FEMA's FIRM indicate portions of the Project are located within the 100-year floodplain (Zone AE; the area with a 1 percent annual chance of flooding).

Revised Table 4.2-4. FEMA Floodplains in the Project Vicinity

FEMA Zone	Project Component
AE	• Landfall/ICW Work Areas • William Floyd Parkway as it exits ICW Work Area at Smith Point Marina
VE	• Landfall Work Area • ICW HDD
A	• Carmans River crossing

The entirety of the Landfall/ICW Work Areas is located within the 100-year floodplain (Zone AE; the area with a 1 percent annual chance of flooding; FIRM panel 36103C0951H). Approximately 1,800 ft (549 m) of the Onshore Transmission Cable will be located within the 100-year floodplain (Zone AE) along William Floyd Parkway as it exits Smith Point Marina (FIRM panel 36103C0951H).

Beach and dune portions of the Landfall/ICW Work Area on Fire Island located oceanside of the William Floyd Parkway and a portion of the ICW HDD are designated as coastal flood zones with velocity (*i.e.*, wave action) hazard (Zone VE; FIRM panel 36103C0951H)). Flood elevations for the 100-year flood zones within the Landfall/ICW Work Areas range from 6 to 17 ft (1.8 to 5.2 m) North American Vertical Datum of 1988 (NAVD88).

Another 1,900 ft (745 m) of the Onshore Transmission Cable will be within the 100-year floodplain at the Carmans River crossing, although base flood elevation data does not exist at this location (Zone A; FIRM panel 36103C0717H)).

All other portions of the Onshore Transmission Cable, Onshore Interconnection Cable, and the Union Avenue Site will be in areas of minimal flood hazard.

The Onshore Facilities are not expected to result in changes to the base flood elevation as the Onshore Transmission Cable will be installed via HDD or installed below the existing grade via trenching within Project areas that are located within the 100-year floodplain.

Agricultural Districts

Article 25-AA of the Agricultural and Markets Law, the Agricultural Districts Law of 1994, permits the establishment of local agricultural districts through landowner initiative, preliminary county review, county adoption, and NYS certification. Agricultural districts encourage improvement and continued use of farmland for agricultural production. Agricultural districts provide landowner incentives, protections from private lawsuits and restrictive local laws, and protect against government funded acquisitions or construction projects, as well as prevent the conversion of agricultural land to nonagricultural uses. Revised Figure 4.2-4 depicts the agricultural districts in the Project's Land Use Study Area.

Information regarding agricultural districts along the Project was obtained from the Suffolk County Department of Economic Development and Planning, Division of Planning and Environment. Based on this information, no portion of the Project is expected to cross agricultural land; however, two parcels within Agricultural District No. 3 (SUFF003) exist within the Land Use Study Area, located along Montauk Highway to the south of Onshore Transmission Cable.

Parks and Recreational Resources

While efforts were made to the extent practicable to avoid recreational resources, the SRWEC–NYS and Onshore Facilities will be located in proximity to the below parks and recreational resources. However, upon completion of construction the SRWEC–NYS, Onshore Transmission Line, and Onshore Interconnection Line will be located wholly underground and will not be visible from these resources.

The SRWEC-NYS will land within Fire Island National Seashore and at Smith Point County Park. The Fire Island National Seashore is a 32-mi (51.5-km) long and 0.25-mi (0.4-km) wide barrier island off the southern coast of Long Island (Bolger 2016). The Fire Island National Seashore encompasses 19,579 acres (7,923 ha) of protected land, featuring undeveloped sandy beaches, high dunes, forestland, and abundant wildlife (ICF 2012). There are also 17 car-free communities on the island, with a summer population of 20,000 (Bolger 2016). A variety of visitors are attracted to Fire Island National Seashore including surfers and nature enthusiasts (ICF 2012), campers, boaters and beachgoers (Bolger 2016). The Project crosses Smith Point County Park, the largest park owned by Suffolk County and is popular with sportsmen, surfers, general beach visitors, and campers.

From the TJB, the Onshore Transmission Cable will run parallel to Fire Island Beach Road within the paved park parking lot, and will cross under William Floyd Parkway to a designated recreation area located west of William Floyd Parkway. Much of this recreation area is undeveloped and maintained as open lawn, however, a number of basketball, volleyball, and handball courts are present as well as a covered pavilion and a restroom facility. The Onshore Transmission Cable will turn to the north/northwest and will then be routed under the ICW in a northwest direction via the ICW HDD to a paved parking lot within the Smith Point Marina. The marina is developed with a boat ramp and 50 parking spots for vehicles with boat trailers.

A number of recreational resources are also present in the vicinity of the Onshore Transmission Cable's crossing of the Carmans River within Southaven County Park, including hiking, camping, fishing, boat rentals, horseback riding, hunting and boating activities on Carmans River.

4.2.2 Potential Land Use Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to land uses, zoning, and local land use plans.

Potential Construction Impacts and Proposed Mitigation

SRWEC-NYS

Construction of the SRWEC-NYS will result in temporary, short-term impacts to land uses adjacent to the landing site off Fire Island National Seashore and at Smith Point County Park. The work space at the Landfall Work Area at Smith Point County Park will be located within paved areas of the parking lot or open land used for recreational activities. Vegetation clearing and grading will be minimal as workspace will be largely limited to the developed areas (*i.e.*, parking lot and surface roads). Use of HDD construction methods for transitioning the SRWEC-NYS to the Onshore Facilities will further avoid and minimize potential impacts to land uses within Smith Point County Park. The construction of the Landfall HDD is expected to occur outside the summer tourist season, which is generally between Memorial Day and Labor Day. Therefore, the effects are expected to be limited and short-term.

Onshore Facilities

Construction of the Project will result in temporary and localized impacts to land uses. The Onshore Transmission Cable and Onshore Interconnection Cable will be constructed entirely underground and predominantly within existing road and utility ROWs.

Construction of the Onshore Transmission Cable and Onshore Interconnection Cable will involve conventional trenching and excavation as well as trenchless construction methods in certain areas. Construction activity will result in some visible site disturbance, such as tree clearing, earth moving, trenchless crossing installations, and cable installation, all of which may temporarily alter the visual character or land uses of the landscape.

The work spaces at the ICW Work Area at Smith Point County Park and Smith Point Marina will be located within paved areas of the parking lots or open land used for recreational activities. Vegetation clearing and grading will be minimal as workspace will be largely limited to the developed areas (*i.e.*, parking lot and surface roads). Use of HDD construction methods for crossing the ICW will further avoid and minimize potential impacts to land uses within Smith Point County Park and Smith Point Marina. Impacts to the Southaven County Park will also be temporary and minimized to the extent practicable and construction activities are not anticipated to impact areas used for recreational activities as the HDD workspace locations have been sited along the roadway corridor of Victory Avenue and an inactive, former park entrance road, however some tree clearing will be required.

Construction of the Onshore Transmission Cable will occur along existing transportation corridors, requiring temporary isolated and/or partial road closures that may result in potential traffic delays, congestion and narrowed roadways. These impacts will be localized and temporary. Roadways and driveways along the Onshore Transmission Cable will not be blocked to local vehicular traffic for extended periods of time. To minimize impacts to local traffic and land uses, several trenchless crossings are planned along the Onshore Transmission Cable. Further, as detailed further in Revised Exhibit E-6: Effect on Transportation, the Applicant will develop a Maintenance and Protection of Traffic Plan (MPTP) as part of the Project EM&CP that will describe measures to minimize and mitigate for potential impacts to land transportation and access to adjacent land uses to the maximum extent practicable during construction. Following construction activities, temporarily disturbed areas within existing ROW will be stabilized and restored to their pre-existing conditions unless otherwise agreed upon in consultation with Suffolk County or the Town of Brookhaven DPWs and in compliance with the SPDES General Permit and SWPPP prepared as part of the Project EM&CP. Unless otherwise waived by the NYSPSC, the Applicant will perform construction activities in accordance with local zoning requirements or other regulatory approvals as detailed in Revised Exhibit 7: Local Ordinances. Once construction is completed, the Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to adjacent properties and land uses. Therefore, the effects are expected to be limited and short-term.

Construction of the OnCS-DC will occur at the Union Avenue Site near the existing Holbrook Substation in an area surrounded by industrial/utility and commercial developments. The OnCS-DC will be constructed on a vacant parcel(s) in the Town of Brookhaven’s Industrial zoning district. General activities include clearing and grading, excavation, and the installation of foundations; the maximum area of land disturbance associated with the construction of the OnCS-DC will be approximately 7 acres (2.8 ha), and the final footprint of the OnCS-DC will be approximately 6 acres (2.4 ha). The remaining area will be used for construction staging/laydown areas and will be stabilized and restored after construction is complete. The OnCS-DC construction will require tree clearing, grading, and excavation within the total construction footprint of the OnCS-DC over a construction period of approximately 2 years. Onsite construction activities will be conducted in compliance with the SPDES General Permit and SWPPP prepared as part of the Project EM&CP. Once the construction of the OnCS-DC is complete, the remaining temporary workspace locations will be stabilized and restored, including the installation of any proposed landscaping/screening. Screening will be implemented at the OnCS-DC to the extent feasible, to reduce potential visibility and impacts to adjacent land uses, and will be detailed in the Project EM&CP. Therefore, no significant impacts to land use will result from the construction of the OnCS-DC.

Potential Operational Impacts and Proposed Mitigation

The SRWEC-NYS will be buried beneath the seafloor and therefore will not result in impacts to land uses once operational.

The operation of the Onshore Transmission Cable and Onshore Interconnection Cable will not require rezoning of existing land uses and will be located entirely underground, within existing disturbed roadway, railroad, and utility ROWs and no ongoing land disturbance is expected following cable installation. Therefore, operation of the SRWEC-NYS, Onshore Transmission Cable and Onshore Interconnection Cable will not impact present or future planned uses.

The operational OnCS-DC will be the only visible infrastructure associated with the Project; however, operation of the OnCS-DC will be consistent with the existing land use and, as such, is not expected have any impacts on adjacent land uses.

Proposed Environmental Protection Measures

As discussed throughout this section, the Applicant will implement the following environmental protection measures to reduce potential impacts on land use. These measures are based on protocols and procedures successfully implemented for similar projects.

- Use of HDD construction methods will avoid and minimize potential impacts to land uses within Smith Point County Park and Smith Point Marina. Further, construction is expected to occur outside the summer tourist season, which is generally between Memorial Day and Labor Day.
- Onshore Facilities are primarily sited within previously disturbed and developed areas (*e.g.*, roadways, ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts to potential land uses.
- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to adjacent properties.
- The OnCS-DC is sited near an existing substation on a parcel zoned for commercial and industrial/utility use.

- Screening will be implemented at the OnCS-DC to the extent feasible, to reduce potential visibility and impacts to adjacent land uses.

4.3 VISUAL AND AESTHETIC RESOURCES

As required by PSL § 122 16 NYCRR §§ 86.3 (a) (1) (iii), 86.5 (b) (2) (ii) and 86.5 (b) (8), this section presents an assessment of potential impacts to aesthetic and visual resources resulting from the construction and operation of the Project. The description of existing conditions and assessment of potential impacts were developed by reviewing existing data sources (*e.g.*, NYS GIS repositories); environmental studies; published scientific literature relating to the evaluation of visual impacts to visually sensitive resources (VSRs) and correspondence and consultation with federal and state agencies.

The SRWEC-NYS and Onshore Facilities are subject to review under the PSL and NYSDEC Program Policy DEP-00-2 Assessing and Mitigating Visual Impacts (NYSDEC 2019b). These sources provide regulations and guidance associated with the siting of major electric transmission facilities and the associated visual assessment procedures.

A description of the existing visual environment and the visual resources are provided below, followed by an evaluation of potential Project-related visual impacts. More detailed information concerning visual resources associated specifically with the OnCS-DC is presented in Revised Appendix 4-B – Visual Resources Assessment.

4.3.1 Visual Study Area

SRWEC-NYS

The SRWEC-NYS construction activities are anticipated to occur within the viewshed of Fire Island. This area includes the Fire Island National Seashore, a popular tourism destination that hosts a variety of activities such as sightseeing, hiking, biking, and various beach activities.

While the viewshed associated with the construction activity cannot be easily defined due to the mobile nature of installation vessels, it is anticipated that potential temporary visual impacts could occur when these activities occur within 0.5 mi (0.8 km) of the Fire Island shoreline.

Onshore Facilities

Visual Study Area and Zone of Visual Influence

The OnCS-DC will be the only visible components of the Onshore Facilities during the operational phase of the Project and therefore the only component that has the potential to result in impacts to visual resources. Temporary impacts during construction associated with the Onshore Transmission Cable and

Onshore Interconnection Cable are also considered for specific resources occurring within the construction corridor.

The OnCS-DC is located in the Town of Brookhaven on the Union Avenue Site, a developed site currently occupied by various commercial industries/small businesses. The site is located on Union Avenue and is generally located south of the LIE (I-495).

The OnCS-DC Visual Study Area (VSA) extends 3 mi (4.8 km) around the proposed limit of disturbance associated with the OnCS-DC (see Revised Figure 4.3-1). The OnCS-DC will consist of a main enclosure and lightning masts. The OnCS-DC enclosure will be up to 70 ft (21 m) in height. The tallest component of the OnCS-DC will be the lightning masts at 100 ft (30.5 m), and therefore the maximum possible height of the OnCS-DC. Since the lightning masts have a relatively slender profile, it is anticipated that this portion of the OnCS-DC will not be visible beyond approximately 1 mi (1.5 km), but the more substantive components (also the lower profile components) of the OnCS-DC could be visible from throughout the OnCS-DC VSA.

Additionally, portions of the Onshore Transmission Cable cross aesthetic resources, which may result in temporary impacts during construction of the Onshore Facilities. Additional information regarding the location and types of resources are described below.

To determine the potential visibility of the OnCS-DC within the VSA and establish a Zone of Visual Influence (ZVI), a lidar viewshed analysis was completed that considered the tallest components of the OnCS-DC and screening provided by topography, vegetation, and structures. The results of the viewshed analysis suggest that approximately 0.8 percent of the OnCS-DC VSA (or 0.3 square miles [sq mi] [0.8 square kilometers (km)]) could potentially have visibility of the OnCS-DC.

Visual Study Area Description

The OnCS-DC VSA includes portions of the Towns of Brookhaven and Islip along with a small portion of Village of Lake Grove in the northwestern portion of the VSA. The entire VSA is within Suffolk County. The visual character of the VSA is generally made up of a mix of high-density development, ranging from industrial to residential. Approximately 52 percent of the VSA is comprised of single-family residences and approximately 6 percent is made up of high-density residential complexes, such as apartment buildings. An additional approximately 17 percent of the VSA is made up of industrial/utility development, such as MacArthur Airport, several substations, a generating facility/power plant and an LNG facility, located adjacent to the OnCS-DC. Recreational and open space makes up approximately 12 percent of the VSA and these areas include parks and golf courses, but also include planned open space and stormwater control features, which do not include facilitation for public access. The remainder of the VSA consists of schools and college campuses, agricultural land (typically nurseries), major transportation corridors (LIE [I-495] and Sunrise Highway [SR 27]), commercial/retail areas, and local roads. Collectively, these additional land uses make up approximately 19 percent of the remaining area in the VSA.

Distance Zones

The following distance zones were delineated for the OnCS-DC VSA:

- Near-Foreground: 0 to 0.5 mi (0 to 0.8 km). At this distance, a viewer can perceive details of an object with clarity. Surface textures, small features, and the full intensity and value of color can be seen on foreground objects. The near-foreground distance zone represents 11 percent of the VSA.
- Foreground: 0.5 to 1.5 mi (0.8 to 2.4 km). At this distance, elements in the landscape tend to retain visual prominence, but detailed textures become muted. Larger scale landscape elements remain as a series of recognizable and distinguishable landscape patterns, colors, and textures.
- Middle ground: 1.5 to 3.0 mi (2.4 to 4.8 km). The middle ground is usually the predominant distance at which landscapes are seen. At these distances, a viewer can perceive individual structures and trees but not in detail. This is the zone where the parts of the landscape start to merge; individual hills become a range, individual trees merge into a forest, and buildings appear as simple geometric forms. Colors are distinguishable but subdued by a bluish cast and a softer tone than those in the foreground. Contrast in texture among landscape elements is reduced.

Landscape Similarity Zones

Defining distinct landscape types within the OnCS-DC VSA provides a useful framework for the analysis of a project's potential visual effects. Landscape Similarity Zones (LSZs) within the OnCS-DC VSA were determined using GIS classification categories provided by the USGS National Land Cover Dataset (NLCD) and Suffolk County land use data. Individual LSZs were defined based on the similarity of various landscape characteristics, including landform, vegetation, water, and land use patterns, in accordance with established visual assessment methods (notably, Smardon et al. 1988; USDA Forest Service 1995; USDI BLM 1984; USDOT FHA 2014). Within the OnCS-DC VSA, seven distinct LSZs were identified: Residential, Industrial, Recreation & Open Space including Forest, Commercial, High-Density Residential, Institutional, and Major Transportation Corridor.

A description of these zones and their location within the OnCS-DC VSA is provided in Revised Appendix 4-B.

Visually Sensitive Resources

VSRs within the VSA were identified in accordance with guidance provided by NYSDEC Program Policy DEP-00-2. In addition, resources that could be considered visually sensitive based on the type or intensity of use they receive were also identified. The categories of VSRs that would be typically required for consideration in VRAs include the following:

- Properties of Historic Significance: National Historic Landmarks, Sites Listed on the S/NRHP; Properties Eligible for Listing on the S/NRHP; National or State Historic Sites.
- Designated Scenic Resources: Rivers Designated as National or State Wild, Scenic, or Recreational; Adirondack Park Scenic Vistas; Sites, Areas, Lakes, Reservoirs or Highways Designated or Eligible for Designation as Scenic; Scenic Areas of Statewide Significance; Other Designated Scenic Resources.
- Public Lands and Recreational Resources: National Parks, Recreation Areas, Seashores, and/or Forests; National Natural Landmarks; NWRs; Heritage Areas; State Parks; State Nature and Historic Preserve Areas; State Forest Preserve lands; State Wildlife Management Areas & Game Refuges; State Forests; State Boat Launches/Waterway Access Sites; Designated Trails; Palisades Park lands; Local Parks and Recreation Areas; Publicly Accessible Conservation Lands/Easements; Rivers and Streams with Public Fishing Rights Easements; Named Lakes, Ponds, and Reservoirs.
- High Use Public Areas: NYS, US, and Interstate Highways, Cities, Villages and Schools.

Using NYSDEC's recommendations for the identification of VSRs (NYSDEC 2019b) and publicly available GIS data layers, 55 VSRs were identified within the OnCS-DC VSA. Of these, 12 occur within the ZVI. Based on these preliminary analyses, one heritage area, three trails, two local parks, and three NYS highways, two hamlets, and one school could potentially have visibility of some portion of the OnCS-DC. These visual resources and their extent of potential visibility are discussed in further detail in Section 4.3.2 and Revised Appendix 4-B.

The Onshore Transmission Cable will cross portions of the Fire Island National Seashore, Carmans River (NYS-designated Scenic River), and Southaven County Park. These visual resources and the extent of potential visual impacts associated with construction are discussed in further detail in Section 4.3.2.

4.3.2 Potential Visual and Aesthetic Resource Impacts and Proposed Mitigation

Construction and operation activities associated with the Project have the potential to cause impacts to visual resources. These impacts may occur when a project compromises the scenic quality or public enjoyment of a VSR. For a visual impact to occur, the Project must first be visible. To establish the ZVI and define areas of visibility, a viewshed analysis was used. For the Onshore Facilities, a viewshed analysis was completed to determine the potential visibility from VSRs within the OnCS-DC (see Revised Appendix 4-B).

Potential Construction Impacts and Proposed Mitigation

SRWEC-NYS

Construction of the SRWEC-NYS may result in temporary, short-term visual impacts to onshore visual resources due to the presence of heavy construction equipment located within the near-shore zone adjacent to the landing site off Fire Island National Seashore. The effects to onshore visual resources are limited to the window in which the construction activities are occurring and are visible to those recreating in the vicinity of the viewshed. The construction of the Landfall is expected to occur outside the summer tourist season, which is generally between Memorial Day and Labor Day. Therefore, the effects are expected to be limited and short-term.

Onshore Facilities

Construction of the Onshore Transmission Cable and Onshore Interconnection Cable may result in temporary, short-term visual impacts to visual resources due to the presence of heavy construction equipment and vehicles. The effects to visual resources are limited to the window in which the construction activities are occurring and are visible to those recreating in the vicinity of the viewshed. The construction schedule for the Onshore Facilities will be designed to minimize activities within local communities during the summer tourist season, whenever feasible. Once construction is completed, the Onshore Transmission Cable and Onshore Interconnection Cable will be located underground and will not include any overhead utility poles, thus minimizing potential impacts to adjacent properties. Therefore, the effects are expected to be limited and short-term.

Construction of the OnCS-DC will occur at the Union Avenue Site near the existing Holbrook Substation in an area surrounded by industrial/utility and commercial developments. General activities include clearing and grading, excavation, the installation of foundations, and construction of the facility. The maximum area of land disturbance associated with the construction of the OnCS-DC will be approximately 7 acres (2.8 ha), and the final footprint of the OnCS-DC will be approximately 6 acres (2.4 ha). The remaining area will be used for construction staging/laydown areas and will be stabilized and restored after construction is complete. The OnCS-DC construction will require tree clearing, grading, and excavation within the total construction footprint of the OnCS-DC over a construction period of approximately 2 years. Once the OnCS-DC's construction is complete, the remaining temporary workspace locations will be stabilized and restored, including the installation of any proposed landscaping/screening. Screening will be implemented at the OnCS-DC to the extent feasible, to reduce potential visibility, and will be detailed in the Project EM&CP.

Generally, the construction activities will result in localized visual impacts within a largely industrial area. Site clearing, site grading, and the construction of the OnCS-DC will likely result in visual change to viewers and users that are familiar with the area, but these types of visual alterations are common along Union Avenue. Certain users, such as bikers and runners that use the Suffolk County Central Corridor Bike Route which runs along Union Avenue are likely to notice visual changes during construction. However, the impacts associated with construction will be temporary in nature and operation of the facility will be consistent with the surrounding land use types, such that it will not significantly impact the enjoyment of the resources adjacent to the site.

Construction of the OnCS-DC will result in the temporary increase of vehicular traffic patterns in locations close to the OnCS-DC site. It is anticipated that minimal visual effects will result from increased traffic during the construction of the OnCS-DC due to the localized and temporary nature of the construction traffic in a generally industrial area.

Construction of the OnCS-DC will typically involve work during daylight hours and the use of temporary security and safety lighting if work at night is necessary. As a result, it is anticipated that lighting associated with construction activities will not result in impacts to visual resources.

Potential Operational Impacts and Proposed Mitigation

SRWEC-NYS

The SRWEC-NYS will be buried beneath the seafloor and therefore will not result in impacts to visual resources.

Onshore Facilities

The Onshore Transmission Cable and Onshore Interconnection Cable will be buried once construction is complete; therefore, the cables will not result in impacts to visual resources.

The operational OnCS-DC will be the only visible infrastructure associated with the Project. Increased traffic associated with routine maintenance of the OnCS-DC in this heavily populated area will not result in impacts to visual resources. Facility lighting will be required for the safe and secure operation of the OnCS-DC; however, the light sources are expected to be lower in profile than the maximum heights used in the viewshed analysis. Additionally, the OnCS-DC is being proposed in an industrialized location with numerous existing light sources, highway traffic, and visual distractions. Due to the developed nature of this area, the lights associated with the OnCS-DC are not expected to contribute significantly to the existing sky glow or light trespass resulting from existing light sources present in the area. Therefore, it is anticipated that minimal visual effects will result from facility lighting.

The OnCS-DC will consist of a main enclosure and lightning masts. The OnCS-DC enclosure will be up to 70 ft (21 m) in height. The tallest component of the OnCS-DC will be the lightning masts at 100 ft (30.5 m), and therefore the maximum possible height of the OnCS-DC. A lidar viewshed analysis was completed to determine the areas within the 3 mi (4.8 km) OnCS-DC VSA that may have visibility of the OnCS-DC (Revised Appendix 4-B). Results of this analysis suggested that only 0.8 percent of the 3-mile (4.8-km) VSA would have visibility of some portion of the OnCS-DC. Of the 55 VSRs identified in the OnCS-DC VSA, 12 occur with the ZVI. Revised Table 4.3-1 provides a summary of the VSRs with potential visibility of the OnCS-DC.

Revised Table 4.3.2-1. Visually Sensitive Resources with Potential OnCS-DC Visibility (Within OnCS-DC ZVI)

Visually Sensitive Resources	Total Number of Resources within the VSA	Total Number of Resources with Visibility
Properties of Historic Significance	**Total 2**	**Total 0**
Properties Listed in National or State Registers of Historic Places (NRHP/SRHP)	1	0
Properties Eligible for Listing in NRHP or SRHP	1	0
Designated Scenic Resources	**Total 0**	**Total 0**
Rivers Designated as National or State Wild, Scenic, or Recreational	0	0
Adirondack Park Scenic Vistas (Adirondack Park Land Use and Development Map)	0	0
Sites, Areas, Lakes, Reservoirs or Highways Designated or Eligible for Designation as Scenic (NYECL Article 49 Title 1) or equivalent)	0	0
Scenic Areas of Statewide Significance (Article 42 of Executive Law)	0	0
Other Designated Scenic Resources (Easements, Roads, Districts, and Overlooks)	0	0
Public Lands and Recreational Resources	**Total 24**	**Total 6**
National Parks, Recreation Areas, Seashores, and/or Forests (16 United States Code [USC] 1c)	0	0
National Natural Landmarks (36 CFR Part 62)	0	0
National Wildlife Refuges (16 USC 668dd)	0	0
Heritage Areas (Parks, Recreation and Historic Preservation Law Section 35.15)	1	1
State Parks (Parks, Recreation and Historic Preservation Law Section 3.09)	0	0
State Nature and Historic Preserve Areas (Section 4 of Article XIV of the State Constitution)	0	0
State Forest Preserves (NYS Constitution Article XIV)	0	0
Other State Lands	0	0
Wildlife Management Areas & Game Refuges	0	0

Visually Sensitive Resources	Total Number of Resources within the VSA	Total Number of Resources with Visibility
State Forests	0	0
State Boat Launches/Waterway Access Sites	0	0
Designated Trails	6	3
Palisades Park (Palisades Interstate Park Commission)	0	0
Local Parks and Recreation Areas	13	2
Publicly Accessible Conservation Lands/Easements	1	0
Rivers and Streams with Public Fishing Rights Easements	0	0
Named Lakes, Ponds, and Reservoirs	3	0
High-Use Public Areas	**Total 29**	**Total 6**
State, US, and Interstate Highways	7	3
Cities, Villages, Hamlets	8	2
Schools	14	1
Total Number of Visually Sensitive Resources in the VSA	**55**	**12**

As shown in Revised Table 4.3-1 VSRs with potential visibility of the OnCS-DC include the Long Island North Shore State Heritage Area, three designated trails (each of which are bike trails), two local parks or recreation areas, three highways, two hamlets, and one school. Additional Information regarding potential visibility from these resources is detailed in Revised Appendix 4-B.

Field verification suggests that the areas of potential visibility of the OnCS-DC will be significantly less frequent than suggested by the viewshed analysis. Longer-distance views throughout the VSA are limited and in most places obstructed by mature vegetation, which generally occurs along most streets and in neighborhoods. The viewshed analysis does not consider the screening provided by roadside vegetation due to the frequent presence of overhead utility lines, which appear in the analysis as screening features if not removed. Other factors that will limit the actual visibility of the proposed OnCS-DC include the narrow, slender profile of the masts, which do not generally attract viewer attention, particularly when viewed amongst foreground to background mature vegetation.

In summary, throughout most of the VSA, the OnCS-DC is not anticipated to be visible due to densely situated buildings and houses in the villages, and dense, mature evergreen and deciduous forest in the surrounding areas. Potential visibility of the OnCS-DC will be generally limited to a few areas within approximately 0.25 mi (0.4 km) of the site. Where visible, it is expected that views of the proposed OnCS-DC from most of these areas will be limited to the uppermost portions of the proposed lightning masts.

Proposed Environmental Protection Measures

As described throughout this section, the Applicant will implement the following environmental protection measures to reduce potential impacts on visually sensitive resources. These measures are based on protocols and procedures successfully implemented for similar projects.

- The construction of the Landfall HDD is expected to occur outside the summer tourist season, which is generally between Memorial Day and Labor Day. The construction schedule for the remaining Onshore Facilities will be designed to minimize activities within local communities during the summer tourist season, whenever feasible.
- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to adjacent properties.
- The OnCS-DC is sited near an existing substation on a parcel zoned for commercial and industrial/utility use.
- Screening will be implemented at the OnCS-DC to the extent feasible, to reduce potential visibility and noise.

4.4 CULTURAL AND HISTORIC RESOURCES

Pursuant to PSL §122 and 16 NYCRR §§ 86.3 (a) (1) (iii) and 86.5 (b) (2) (i), this section assesses the potential for cultural resources to be affected by the construction and operation of the Project. For the purposes of this analysis, cultural resources include marine archaeological resources (MARs) (located underwater), terrestrial archaeological resources (located on land), and above-ground historic architectural resources (above-ground historic resources).

The SRWEC-NYS, Onshore Transmission Cable, OnCS-DC, and Onshore Interconnection Cable are subject to review under the PSL Article VII and Section 14.09 of the New York State Historic Preservation Act of 1980. These sources provide regulations and guidance associated with the siting of major electric transmission facilities and the associated procedures for assessing potential impacts to above-ground historic properties.

4.4.1 Existing Cultural and Historic Resources

Marine Archaeological Resources

This section describes the existing conditions as they relate to MARs. The description of the existing conditions of potential impacts as described in Section 4.4.2 were developed by reviewing current public data sources related to MARs, including NYS and federal agency-published papers and databases (*e.g.*, the Bureau of Ocean Energy Management [BOEM] Archaeological Resource Information Database [2013], NOAA Wrecks and Obstructions Database [2016], and the NYSHPO's CRIS database [2020]); environmental studies (National Centers for Environmental Information [NCEI] 2020), published scientific literature relating to the geologic and historic contexts of marine components of the Project, and correspondence and consultation with federal and NYS agencies and Native American tribes. A description of the MARs within the vicinity of the SRWEC–NYS and the Onshore Transmission Cable ICW HDD are provided below. The Preliminary Area of Potential Effects (PAPE) for potential direct impacts to MARs is defined as the area encompassing all proposed seabed disturbances associated with the SRWEC–NYS and the ICW HDD. The other Onshore Facilities will not have direct or indirect impacts on MARs.

Regional Environment

MARs consist of (1) historic period sites, such as shipwrecks and associated remains, sunken aircraft, and other maritime infrastructure; and (2) pre-contact archaeological sites once part of the terrestrial landscape and since inundated by global sea level rise during the late Pleistocene and Holocene (BOEM 2020a). Pre-contact MARs include potentially archaeologically sensitive landscapes, now submerged, that would have supported human occupation prior to marine transgression. During the ensuing glacial retreat, pro-glacial lakes formed in front of the retreating glacier as the outflowing glacial meltwater was dammed behind moraines (Poppe et al. 2012).

These lakes and their associated braided fluvial systems that flowed south would have provided resource-rich areas for potential human populations seeking freshwater sources for productive hunting and fishing grounds. By 15,000 years ago, the glacial lakes drained, and sea levels began to rise rapidly, transforming the former lake beds into estuaries and fringing marshlands. When subaerially exposed, these resource-rich environments would have played a vital role in the survival of local populations. Submerged/buried pre-contact cultural resources within the area might include shell middens and resource procurement sites; these archaeological features have the highest probability for preservation along paleo landforms such as submerged paleochannels, natural levees, and inset terraces.

Later cultural group sites (*e.g.*, Early/Late Archaic and Woodland Period) may be encountered along portions of the SRWEC—NYS. Additionally, early European exploration, increased maritime activity during the following centuries, as well as post-contact Native American maritime practices all contribute to the maritime historical context of the region and result in a potential for post-contact submerged cultural resources to exist within the PAPE. A review of public data sources was conducted to identify charted shipwrecks and/or obstructions within 1 mi (1.6 km) of the SRWEC–NYS centerline.

SRWEC–NYS

MARs that may be encountered within the SRWEC–NYS include both pre-contact sites and post-contact sites. Historic sea-level rise data indicates that this portion of the SRWEC—NYS would have been submerged approximately 4,000 years before present (yBP), so it is unlikely that any submerged, buried Woodland Period (3,000–400 yBP) sites will be identified nearshore (Merwin 2010).

In terms of potential historic-period MARs within the SRWEC–NYS, databases consulted during background research revealed three shipwrecks and/or obstructions within 1 mi (1.6 km) of the SRWEC–NYS centerline but not within the SRWEC–NYS corridor.

Terrestrial Archaeological Resources

This section describes the existing conditions as they relate to terrestrial archaeological resources. Information to supplement this section can be found in Appendix 4-D – Phase 1A Archaeological Survey and Appendix 4-D Addendum (the Phase IA Report). The Phase IA Report outlines the research design, soils, physical topography, historic context, and the fieldwork methodology employed during the archaeological field survey. The Phase IA Report also provides detailed information on the archaeological testing locations identified for Phase 1B surveys that are currently in-progress to determine if archaeological resources will be impacted during construction of the Onshore Facilities.

The description of the existing conditions and assessment of potential impacts as described in Section 4.4.2 below were developed by reviewing currently-available data sources related to terrestrial archaeological resources, including NYS and federal agency-published papers and databases, online data portals and mapping databases (*e.g.*, the NYSHPO's CRIS database), environmental studies, published scientific literature relating to relevant prior cultural resources studies in the vicinity of the Onshore Facilities, and correspondence and consultation with federal and NYS agencies.

Archaeological investigations of the Onshore Facilities are being conducted in accordance with the New York Archaeological Council's (NYAC) Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York State (the NYAC Standards) and the NYSHPO Guidelines, entitled *Phase I Archaeological Report Format Requirements*, as appropriate. The archaeological investigation was overseen by a Registered Professional Archaeologist (RPA) who meets the US Secretary of Interior's Standards for Archaeology (per 36 CFR 61). In addition, the information gathered in the archaeological survey will be used to fulfill Project requirements under Section 106 of the National Historic Preservation Act (NHPA).

The NYAC Standards and NYSHPO Guidelines establish a phased approach to identification and evaluation of archaeological resources. This typically begins with a desktop review of information maintained by the

NYSHPO in CRIS, professional literature, historical cartography, and online resources. The CRIS database includes S/NRHP-eligible and -listed properties and sites, historic districts, previously recorded archaeological sites, cemeteries, and areas subject to previous archaeological investigations. The desktop review is followed by field testing for the presence of archaeological deposits in the PAPE. If intact archaeological deposits are found, and avoidance is not feasible, further investigations may be required to determine eligibility for the S/NRHP.

The terrestrial archaeological investigation is focused on the PAPE for direct impacts. The PAPE for terrestrial archaeological resources is defined as the area containing all proposed soil disturbance or other alteration associated with the Landfall Work Area and the Onshore Facilities. The PAPE was determined based on the maximum spatial limits of ground disturbance associated with the SRWEC Landfall Work Area at Smith Point County Park (TJBs and link boxes) and Onshore Facilities (ICW Work Area, Onshore Transmission Cable, OnCS–DC, and Onshore Interconnection Cable). The SRWEC–NYS is not considered part of the PAPE for terrestrial archaeological resources given its location in the marine environment but is described above.

Onshore Facilities

Based on archival research, potential archaeological resources within the PAPE might include both pre-contact Native American and historic-period sites. Pre-contact Native American resources are those older than 1500 AD, often comprising lithic debris (stone flakes) and/or tools and projectile points, ceramics, and possible shell or bone food refuse. Historic-period archaeological resources may include glazed ceramics, glass, metal tools and hardware, as well as manufactured personal and decorative artifacts. The presence of modern materials is also expected, such as plastic fragments, modern bottle glass, synthetics, and twentieth-century architectural materials.

A review of CRIS to identify previously reported cultural resources that might be directly affected by the Project shows that two recorded pre-contact archaeological sites are within the PAPE. Little information is known or recorded about these sites in the NYSHPO database. They are depicted in CRIS as areas of elevated archaeological sensitivity and should not be considered equivalent to formally tested and delineated archaeological sites. Additional information on these sites can be found in Appendix 4-D and Appendix 4-D Addendum.

In addition, there is one historic-period sites located immediately adjacent to the PAPE. This historic-period site, the Carmans Mill and Homestead Site (USN 10302.001130), is located immediately adjacent to the PAPE. The mill dates from early to mid-eighteenth century and was destroyed in 1958 for construction of the Sunrise Highway while the house was privately removed in 1936. The site formerly encompassed a relatively small area adjacent to the PAPE, but has since been destroyed by construction of Sunrise Highway. These previously documented archaeological sites are described in greater detail in Appendix 4-D and Appendix 4-D Addendum.

The Applicant consulted the CRIS database and professional literature to determine if previous archaeological surveys had been conducted within, or within 0.25 mi (0.40 km) of, the PAPE. In total, five cultural resource surveys overlap with portions of the PAPE. According to the CRIS database, three previous surveys overlap with portions of the PAPE and consist of one Phase IA survey in support of municipal sewer improvements (Louis Berger Group 2016), one Phase IB survey in support of municipal sewer improvements (Chrysalis Archaeological Consultants 2018), and one combined Phase IA/IB archaeological and architectural survey in support of road improvements (NYSM 2010). In addition, two archaeological management plans were conducted for the Fire Island National Seashore (Gray & Pape [GP] 2005; William and Mary Center for Archaeological Research 2016). Additional detail on these surveys can be found in Appendix 4-D and Appendix 4-D Addendum.

Only one of the surveys noted above (NYSM 2010) conducted archaeological testing (*i.e.*, shovel testing, pedestrian surface survey, etc.) anywhere within the PAPE. A review of the technical report completed for the survey indicates that shovel testing conducted for that project overlaps portions of the PAPE, along the south side of Victory Avenue. No archaeological resources were identified within the PAPE, but shovel testing identified the Southaven Circle Site (USN 10302.002928), described above, which abuts the PAPE.

Ten previous archaeological surveys/investigations have been conducted outside the PAPE but within a 0.25-mi (0.40-km) buffer. One other previous archaeological survey in the general vicinity of the Landfall Work Area but is not within the PAPE or the 0.25-mi (0.40-km) buffer (Panamerican Consultants, Inc. 1999, 2003). All of the surveys located outside the PAPE are described in greater detail in Table 1 and Figure 2 in Appendix 4-D and Table 2.2.-1 and Figure 2.2-1 in Appendix 4-D Addendum.

With respect to the potential for archaeological resources in the PAPE, the Applicant developed a sensitivity model as described in Appendix 4-D and Appendix 4-D Addendum. Due to the presence of several previously identified pre-contact archaeological sites within and/or near the PAPE, as well as the proximity to the coast and freshwater streams, the intact landforms of the PAPE should be considered sensitive for the presence of pre-contact Native American archaeological resources, particularly across the eastern portion of the PAPE (see Figure 3 in Appendix 4-D and Figure 2.6-1 in Appendix 4-D Addendum).

Much of the PAPE is characterized by post-contact Native American or Euro-American domestic sites, reflecting a mixture of small households and large farms dating from the eighteenth and nineteenth centuries. This was followed by dense mid-to late-twentieth century residential development. With respect to historic-period archaeological sensitivity, as mentioned above, there are 7 previously recorded archaeological sites with historic-period components located within 0.25 mi (0.40 km) of the PAPE. These sites, all of which are associated with former structures (*i.e.*, houses, tavern/store, mill, and church), consist of architectural and/or domestic artifact scatters, primarily dating to the eighteenth and/or nineteenth centuries. As illustrated by these sites, when determining the probability of encountering historic-period archaeological resources, increased potential exists at the locations of former structures. As such, a review of historical maps for identifying map-documented structures (MDS) is the most effective way for determining historic period archaeological sensitivity. As part of the background research for the Project, the Applicant collected data from multiple historical cartographic sources, described in greater detail in the Phase IA Report (Appendix 4-D and Appendix 4-D Addendum).

Due to the presence of previously identified historic-period archaeological sites near the PAPE and the significant amount of MDS locations along the Onshore Transmission Cable and Onshore Interconnection Cable, the intact landforms of the PAPE should be considered sensitive for the presence of historic-period archaeological resources, particularly in the vicinity of communities that have existed prior to suburbanization.

Above-ground Historic Resources

This section describes the existing conditions as it relates to above-ground historic properties. The descriptions of the existing conditions and assessment of potential impacts as described in Section 4.4.2 below were developed by reviewing current public data sources related to above-ground historic properties, including NYS and federal agency-published papers and databases; online data portals and mapping databases (*e.g.*, the NYSHPO CRIS); published scientific literature relating to relevant evaluations of visual effects to above-ground historic properties; and correspondence and consultation with federal and NYS agencies and tribes.

A description of the above-ground historic properties within the Historic Resources Study Area (HRSA), defined as a 1-mi (2-km) radius for the OnCS-DC (OnCS-DC HRSA) (see Revised Figure 4.4-1). More detailed information concerning the methodology and results for all above-ground historic properties analyses conducted for the Project are presented in Revised Appendix 4-B and Revised Appendix 4-C – Onshore Above-ground Historic Properties Report. For the purposes of this analysis, the HRSA for above-ground historic properties is limited to the Union Avenue Site HRSA, defined below.

Above-ground historic properties are defined as districts, buildings, structures, objects, or sites that are listed or determined eligible for listing in the S/NRHP or which have been designated as National Historic Landmarks (NHL). The identification of these resources and the evaluation of potential impacts involved the completion of desktop and field studies, which are detailed in Revised Appendix 4-C.

To determine the potential visual effects to historic properties, an HRSA extending 1 mi (1.6 km) from the Union Avenue Site was delineated. Although above-ground transmission infrastructure in NYS typically requires a 3 mi (4.8 km) study area for an assessment of visual impacts, based on the relatively low height and minimal potential visual impact of the proposed OnCS–DC, a 1 mi (1.6 km) study area for the Union Avenue Site was considered sufficient. While visibility beyond 1 mi (1.6 km) may be possible, the nature and degree of potential visual impacts will be minimal beyond 1 mi (1.6 km) due to the similarity in scale and general type of the proposed converter station with existing infrastructure and land uses at the proposed location, as well as significant screening of potential OnCS–DC visibility by area topography. The 1 mi (1.6 km) HRSA includes approximately 4.1 sq mi (10.6 sq km) within the Towns of Brookhaven and Islip (see Revised Figure 4.4-1).

SRWEC–NYS

The SRWEC–NYS construction activities are anticipated to occur within the viewshed of Fire Island. This area includes the Fire Island National Seashore, a popular tourism destination that hosts a variety of activities such as sightseeing, hiking, biking, and various beach activities.

While the viewshed associated with the construction activity cannot be easily defined due to the mobile nature of installation vessels, it is anticipated that potential temporary visual impacts could occur when these activities occur within 0.5 mi (2,640 ft/1 km) of the Fire Island shoreline. During operation, the SRWEC-NYS will be buried beneath the seafloor and will not be visible from above-ground historic properties.

Onshore Facilities

The OnCS–DC will be the primary visible components of the Onshore Facilities during the operational phase of the Project and therefore the only component that has the potential to result in impacts to above-ground historic properties. The visual character of the 1-mi (1.6-km) HRSA is generally made up of a mix of high-density development, ranging from industrial to residential, and major transportation facilities which are anticipated to significantly screen potential views of the OnCS–DC beyond 1 mi (1.6 km).

To determine the potential visibility of the OnCS–DC within the OnCS–DC HRSA and establish a PAPE, a lidar viewshed analysis was completed considering the tallest components of the OnCS–DC and screening provided by topography, vegetation, and structures (see Section 4.3, Visual and Aesthetic Resources and Revised Appendix 4-B). The results of the viewshed analysis suggest that approximately 5.7 percent of the OnCS–DC HRSA (or 0.24 sq mi [0.6 sq km]) could potentially have visibility of the OnCS–DC.

Review of the NYSHPO CRIS website determined that nine previously identified above-ground historic properties are located within the OnCS–DC HRSA. Of these, two are within the PAPE. The historic resources survey conducted for the OnCS–DC determined that no additional above-ground historic properties that meet eligibility criteria for listing in the S/NRHP are located within the OnCS–DC PAPE, and one previously identified above-ground historic property within the OnCS–DC PAPE was no longer extant. Based on these analyses, only one above-ground historic property, Waverly Cemetery, may have visibility of some portion of the OnCS–DC. This property and the extent of potential visibility and potential impacts to its historic setting are discussed in further detail in Section 4.4.2 below.

4.4.2 Potential Cultural Resource Impacts and Proposed Mitigation

This section describes the potential effects from the construction and operation of the Project as they relate to MARs, terrestrial archeological resources, and above-ground historic properties.

Potential Construction Impacts and Proposed Mitigation

Construction activities associated with the Project have the potential to cause direct and indirect impacts to cultural resources.

Marine Archaeological Resources

The SRWEC–NYS will be sited to avoid or minimize impacts to potential MARs, including shipwrecks and paleolandforms, to the extent practicable, with continued oversight by a Qualified Marine Archaeologist.

Construction of the SRWEC–NYS has the potential to cause both direct and indirect impacts on submerged cultural resources (shipwrecks and/or paleolandforms) through direct impacts to the seafloor and sediment suspension and deposition during installation activities.

Installation of the SRWEC–NYS will introduce direct bottom impacts to the seafloor. Previously identified shipwrecks and unidentified cultural resources (both pre-contact and post-contact)[1] may be impacted directly by installation or indirectly by other associated bottom disturbance activities. Preparation of the seafloor for installation of foundations and cables may include sand wave leveling and the clearance of

[1] These terms use the European exploration and colonization of the North American Continent as a cultural benchmark for our understanding of Native American cultures. The Pre-Contact Period serves as a summary of key events and concepts prior to the European entrada; the Post-Contact Period represents cultural adaptation that continues to the present day.

debris, boulders, and other objects. DP vessels will generally be used for cable burial activities. If anchoring (or a pull-ahead anchor) is necessary during cable installation, it will occur within the survey corridor. The excavation of a subsurface trench in which to lay the cables would impact submerged resources located within, or adjacent to, the trench during its excavation. These activities could impact archaeological resources located within the area of seafloor preparation.

The maximum vertical limit of disturbance will include 10 ft (3 m) from cable installation, 16 ft (5 m) for the HDD exit pits, and 15 ft (4.7 m) from potential vessel anchorage. The Applicant has taken the necessary steps to site the SRWEC–NYS away from previously identified submerged resources, and 164-ft (50-m) minimum avoidance areas surrounding identified MARs will further reduce the chances of accidental disturbance.

The installation of the Onshore Transmission Cable will include a 2,660-ft (810-m) long HDD that will be below the ICW. The maximum vertical limit of disturbance will be confirmed following additional design and engineering.

Increased vessel traffic associated with the SRWEC–NYS may introduce direct bottom impacts to the seafloor. Directly associated with bottom disturbance, this increase could affect MARs by creating an environment where physical damage may occur from indiscriminate anchoring practices, offloading mishaps, and dumping. This activity would primarily affect those submerged resources that are exposed on the seafloor or are partially obscured by shallow sediments, such as shipwrecks. Anchor drops, anchor drags, and jettisoned construction debris from surface vessels can damage the integrity or destroy MARs over time. Deeply buried pre-contact sites are not anticipated to be affected by activities associated with increased vessel traffic. With boating regulations, defined anchorage areas, and MARs monitoring by marine archaeologists, the damaging effects to submerged MARs sites from increased traffic are anticipated to be minimal.

Construction activities associated with the SRWEC–NYS will cause the suspension and deposition of sediments found near and adjacent to the areas of seafloor disturbance. Sediment suspension and deposition will primarily affect MARs exposed above the seafloor, such as shipwrecks. The suspension of sediment covering previously buried elements of the resource may expose those sections to further impacts, such as an increased threat of corrosion. Previously buried wooden timbers may be subject to attack by shipworms (*Toredo navalis*), a form of saltwater clam that can destroy historic intact shipwreck remains in a matter of months. The suspension and deposition of sediments is not expected to impact more deeply buried submerged cultural resources, such as pre-contact archaeological resources that may be buried several meters below the seafloor. Furthermore, a 164 ft (50 m) minimum avoidance area surrounding identified MARs will limit the amount of sediment suspension and deposition near the resource; therefore, the potential for impacts from sediment suspension and deposition is low.

Terrestrial Archaeological Resources

Construction activities associated with the Onshore Facilities have the potential to cause both direct and indirect impacts on terrestrial archaeological resources related to land disturbance. No direct or indirect impacts are expected from the Landfall or ICW Work Areas. The SRWEC–NYS will not result in impacts on terrestrial archaeological resources, and its location is not considered part of the PAPE for terrestrial archaeological resources given its location in the marine environment.

Construction of the Onshore Facilities will result in land disturbance from site clearance, grading, excavation, and filling during the construction phase of the Landfall and ICW Work Areas, Onshore Transmission Cable, the OnCS-DC, and Onshore Interconnection Cable.

The Onshore Transmission Cable will extend from the TJBs at Smith Point County Park on Fire Island to the OnCS-DC at the Union Avenue Site, where the Onshore Interconnection Cable will extend to the existing Holbrook Substation, all of which will be sited within the Town of Brookhaven. It is anticipated that the vertical limits of disturbance for construction of Onshore Facilities will range from approximately 3 ft (0.9 m) to 15 ft (4.6 m) in depth based on the respective component, based on site selection and final design.

The Applicant completed an archaeological reconnaissance survey of the Onshore Transmission Cable, OnCS-DC, and Onshore Interconnection Cable and Phase 1B archaeological surveys are currently ongoing.

The majority of the Onshore Facilities have been sited within previously disturbed areas and will therefore avoid archaeological sites and/or historic properties. Additionally, the results of the previous terrestrial archaeological studies, as well as agency and tribal input, are being considered during development of the Project. As a result, the Project design is anticipated to avoid direct impacts to reported archaeological resources. Although every effort will be made to site the Onshore Facilities away from known archaeological resources, unanticipated discoveries during construction remain a possibility. Therefore, construction of the Onshore Facilities maintains the potential to result in direct impacts to terrestrial archaeological resources. The Applicant will prepare an Unanticipated Discovery Plan in accordance with NYS and federal laws as part of the Project EM&CP. The plan will provide specific contacts and reporting protocol if archaeological materials or human remains are discovered during construction.

__Above-ground Historic Resources__

Construction activities associated with the SRWEC–NYS and Onshore Facilities have the potential to cause both direct and indirect impacts on above-ground historic properties, including visibility from physical structures and associated lighting, noise, and traffic. Supporting information on impacts to above-ground historic properties are also presented in further detail in Revised Appendix 4-C.

SRWEC–NYS

The SRWEC–NYS construction activities are anticipated to occur within the viewshed of portions of Fire Island and may cause temporary visual impacts to above-ground historic properties with views of the nearshore setting. While the viewshed associated with the construction activity cannot be easily defined due to the mobile nature of installation vessels, it is anticipated that potential temporary visual impacts could occur when these activities occur within 0.5 mi (1 km) of the Fire Island shoreline. Fire Island receives an estimated 2.2 million visitors a year, primarily in July and August (NPS 2018c). Fire Island National Seashore receiving 391,311 visitors in 2019 (NPS 2020). Due to the mobile and temporary nature of this activity, a historic resources study area has not been defined, and the impacts discussion will generally describe the degree of visual impacts to above-ground historic properties from the SRWEC–NYS.

Construction of the SRWEC–NYS will require excavation for the TJBs and link boxes, which will provide the juncture between the SRWEC–NYS and the Onshore Transmission Cable. Landfall construction activity will include the use of an HDD. The HDD methodology will require temporary use of a Landfall HDD Work Area located onshore within which the TJBs will be installed and where HDD construction activities will occur. An open cut methodology is not being considered to reduce potential impacts to coastal resources inclusive of above-ground historic properties and the mobile seafloor close to the shoreline. The main visible elements of the activities associated with SRWEC–NYS construction will include a pull winch attached to either a piled anchor or a gravity anchor (*e.g.*, a large bulldozer) used to pull the cable through the conduit, as well as the vessels located offshore at the HDD exit pit. The above-ground construction activities will be temporary in nature, with the majority of the construction activities occurring outside the summer tourist season over the course of two years. As such, construction of the SRWEC–NYS is anticipated to result in temporary, negligible impacts to above-ground historic properties.

Construction activities associated with the SRWEC–NYS are expected to generate noise from heavy equipment performing excavation, drilling, winching of the cable toward shore, and heavy lifting of TJBs, link boxes, and other components. However, this type of noise will be temporary in nature, as described in Revised Appendix 4-I – Onshore Acoustic Assessment. As such, temporary negligible impacts to above-ground historic properties may occur during the construction of the SRWEC–NYS.

Onshore Facilities

The Onshore Facilities have been sited to minimize impacts to above-ground historic resources, as the Onshore Transmission Cable and Onshore Interconnection Cable will be located within previously disturbed ROWs to the extent practicable and the OnCS- DC will be located in industrial area. Potential visual impacts to above-ground historic properties associated with construction of the Onshore Facilities are expected to be temporary in duration, including visibility from physical structures and associated lighting, noise, and traffic.

Construction of the Onshore Transmission Cable and Onshore Interconnection Cable will involve site preparation, duct bank installation, cable installation, cable jointing, final testing, and site restoration with additional steps associated with HDD and other trenchless crossing methods. However, the sites will be mostly screened from existing above-ground historic properties by existing vegetation and structures. Therefore, it is anticipated that only temporary, negligible impacts to above-ground historic properties will occur during the construction phase of the Onshore Facilities.

Construction of the Onshore Facilities will typically take place during daylight hours. However, nighttime lighting may be required during the construction of the Onshore Transmission Cable, OnCS-DC, and Onshore Interconnection Cable. These lights will be consistent with the existing lighting conditions and will be similar to lighting from typical municipal road work or utility repairs in the vicinity due to commercial and industrial areas in the vicinity. As a result, it is anticipated that construction lighting associated with the OnCS-DC and Onshore Interconnection Cable could result in temporary, negligible impacts to above-ground historic properties.

In addition, the Onshore Transmission Cable may require some nighttime construction at sites utilizing trenchless crossings. These may include a crossing of major roadways, Sunrise Highway (SR 27); two railroad crossings (the LIRR); and up to two waterways (ICW and Carmans River). Construction may not necessarily be screened by existing vegetation or structures. However, given the temporary nature of the construction activities, it is anticipated that construction lighting associated with the Onshore Transmission Cable could result in temporary, negligible impacts to above-ground historic properties.

Construction activities associated with the OnCS-DC is expected to generate noise from heavy equipment performing clearing, grading, excavation, the installation of foundations, and heavy lifting of substation components. However, this type of noise is not out of context within a working industrial area and will be temporary in nature. Anticipated construction activities are expected to last up to approximately 2 years. As such, temporary, negligible impacts to above-ground historic properties are anticipated from noise associated with the construction of the OnCS-DC.

Noise associated with the construction of the Onshore Transmission Cable and Onshore Interconnection Cable components is anticipated to be similar to noise generated during typical municipal road work or utility repairs. This type of noise is will be temporary in nature, as described in Revised Appendix 4-I, temporary negligible impacts to above-ground historic properties may occur during the construction of the Onshore Transmission Cable and Interconnection Cable.

During construction of the OnCS–DC, vehicular traffic will increase, and construction equipment will be present along the OnCS–DC site, which may result in short-term noise and vibration. Given that the Union Avenue Site is more than 0.6 mi (1 km) from the nearest above-ground historic property, only temporary, negligible impacts to above-ground historic properties could result from increased traffic associated with the construction of the OnCS–DC.

Construction of the Onshore Transmission Cable will occur along existing transportation corridors, requiring temporary isolated and/or partial road closures that may result in potential traffic delays, congestion, and narrow roadways. These impacts would be localized and temporary. Therefore, increased traffic associated with the construction of the Onshore Transmission Cable and the Onshore Interconnection Cable is not anticipated to result in impacts to above-ground historic properties due to the location of the activities within existing roads and utility ROWs in an existing industrial area.

Potential Operational Impacts and Proposed Mitigation

Marine Archaeological Resources

Regular operational activities are not expected to cause irreparable damage to MARs or involve activities that have potential to cause impacts to MARs when those activities are carried out in accordance with recommendations of the Project's marine archaeologists. Any inadvertent damage to submerged cultural resources caused from seafloor disturbance, increased traffic, and sediment suspension and redeposition will be reported to all appropriate agencies and managed by the Project's Qualified Marine Archaeologist. However, if damage occurs because of this activity, there may be localized impacts to MARs from operational activities.

Activities occurring during the operation phase may also affect MARs. Impacts associated with seafloor disturbance that can be reasonably anticipated to arise during operation and maintenance are those associated with anchoring or spudding of vessels conducting routine or non-routine maintenance. Non-routine maintenance might also include the uncovering or reburial of the SRWEC–NYS in the event of a fault or failure. This process would likely disturb the seafloor and have the potential to impact nearby resources. The MARs potentially impacted by the operational phase of the Project would be limited to those resources also potentially impacted during the construction phase, unless bottom disturbance (due to needed repairs) is required outside of previously disturbed areas or within previously established 164 ft (50 m) minimum avoidance area.

Increased vessel traffic associated with the operation of the SRWEC–NYS will also introduce direct bottom impacts to this environment. Directly associated with bottom disturbance, this increase may affect submerged cultural resources by creating an environment where physical damage may occur from indiscriminate anchoring practices, offloading mishaps, and dumping; particularly by boat crews who are unfamiliar with the protective avoidance buffers initially established to protect previously identified MARs in the area. This activity would primarily affect those submerged resources that are exposed on the seafloor or are partially obscured by shallow sediments, such as shipwrecks. Anchor drops, anchor drags, and jettisoned debris from surface vessels can damage the integrity or destroy a submerged archaeological site over time. Deeply buried pre-contact archaeological resources are not anticipated to be affected by activities associated with increased shipping and boating traffic. With boating regulations, defined anchorage areas, and MARs monitoring by marine archaeologists, however, the damaging effects to submerged MARs sites from increased traffic are expected to be minimal.

Impacts to MARs from sediment suspension and deposition during operations may occur, although impacts are less likely than during construction. The suspension of sediments wholly or partially covering a submerged cultural resource may expose that resource to damage from environmental factors to which it may not have been previously subjected. For example, components or sections of an historic shipwreck that are newly exposed to an aerobic environment may be impacted through corrosion or by organisms not found in anaerobic environments (*e.g.*, shipworms). Nevertheless, the avoidance buffer surrounding identified resources are expected to significantly limit those potential impacts.

Terrestrial Archaeological Resources

Disturbance to terrestrial archaeological resources during the operation phase are expected to occur only during instances where there is a system failure that requires re-excavation of any portion of the Onshore Transmission Cable or Onshore Interconnection Cable. If that occurs, the impact is expected to be similar to, or less than, what was described for the construction phase above. In addition, any operation disturbance would generally be limited to locations previously disturbed during installation of the Project facilities; therefore, no impact during operation is anticipated.

Above-ground Historic Resources

During operations, the SRWEC–NYS will be buried beneath the seafloor and therefore will not result in impacts to above-ground historic properties.

Due to minimal anticipated visual intrusion of the Onshore Facilities on the historic setting of adjacent above-ground historic properties, the operational phase is expected to have minimal visual impacts on above-ground historic properties. The OnCS-DC will be the primary visible component of the Onshore Facilities during the operational phase of the Project and therefore the only component that have the potential to result in impacts to above-ground historic properties. Upon completion of the construction phase of the Onshore Transmission Cable, there will not be any visible components of the installed cable and therefore no visual impacts to above-ground historic properties. Potential impacts associated with the Onshore Facilities during the operational phase include noise, traffic, visible infrastructure, and lighting and marking.

The Onshore Transmission Cables and Onshore Interconnection Cable will have no impact with respect to noise during operations since the cable will be buried beneath existing roads or within other public and utility ROWs. The Union Avenue Site is located within a developed urban environment. Noise generated by the OnCS-DC is expected to cause minimal increase in ambient sound levels (Revised Appendix 4-I) and will be difficult to perceive within the immediate industrial context of its location. As such, negligible impacts to historic properties resulting from operational noise are anticipated for the duration of operation.

The Onshore Transmission Cable and Onshore Interconnection Cable will have no regular maintenance unless there is a failure or malfunction requiring exposure and repair of the cable. If any unforeseen maintenance is required, impacts to traffic from potential traffic detours might occur but will result in no impacts to above-ground historic properties. The OnCS-DC will be unmanned during routine operations and will be inspected regularly based on manufacturer-recommended schedules. Personnel will be on site as necessary for any maintenance or repairs. It is likely that no noticeable increase over existing traffic patterns will occur. Therefore, it is anticipated that the traffic will have a long-term negligible impact on historic properties.

A lidar viewshed analysis was completed to determine the areas within the 1-mi (1.6-km) OnCS-DC HRSA that may have visibility of the OnCS-DC. Results of this analysis suggested that only 5.7 percent of the 1-mi (1.6-km) OnCS-DC HRSA will have visibility of some portion of the OnCS-DC. Of the nine resources identified within the OnCS-DC HRSA, only one will have visibility of the facility. Waverly Cemetery, an approximately 1.85-acre (0.75 ha) cemetery, is located approximately 0.6 miles (1 km) east of the proposed OnCS-DC on the northeast corner of Washington and Union Avenues in the hamlet of Holtsville. The OnCS-DC will consist of a main enclosure and lightning masts. The OnCS-DC enclosure will be up to 70 ft (21 m) in height. The tallest component of the OnCS-DC will be the lightning masts at 100 ft (30.5 m), and therefore the maximum possible height of the OnCS-DC. The area will be graveled and surrounded by a 7 ft (2 m) high fence with a 1 ft (0.3 m) tall, barbed wire for a total height of 8 ft (2.4 m). Based on these results, it is anticipated that the operations and maintenance of the OnCS–DC will result in negligible visual effects to above-ground historic properties for the duration of operation.

Operational lighting associated with the OnCS–DC will be required for the safe and secure operation of the facility. However, the light sources are expected to be lower in profile than the maximum heights used in the viewshed analysis. As such, the lights associated with the OnCS–DC are expected to have minimal visibility from above-ground historic properties. Due to the developed nature of this area, the lights associated with the OnCS–DC are not expected to contribute significantly to the existing sky glow resulting from existing light sources present in the area. Therefore, it is anticipated that the OnCS–DC lighting will have a negligible long-term effect on historic properties.

Proposed Environmental Protection Measures

As discussed throughout this section, the Applicant will implement the following environmental protection measures to reduce potential impacts on cultural resources. These measures are based on protocols and procedures successfully implemented for similar projects.

- The SRWEC–NYS will be sited to avoid or minimize impacts to potential MARs, including shipwrecks and paleolandforms, to the extent practicable, with continued oversight by a Qualified Marine Archaeologist.
- Native American tribes were involved, and will continue to be involved, in marine survey protocol design, execution of the surveys, and interpretation of the results.
- A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.
- Minimum avoidance areas of 164 ft (50 m) surrounding identified MARs will reduce the chances of accidental disturbance.
- Onshore Facilities are primarily sited within previously disturbed and developed areas (*e.g.*, roadways, ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts to potential archaeological resources.
- Onshore Facilities have been sited, using guidance from cultural resources surveys, to avoid or minimize impacts to potential terrestrial archeological resources.
- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to adjacent properties.

- The OnCS-DC is sited near an existing substation on a parcel zoned for commercial and industrial/utility use.
- Screening will be implemented at the OnCS-DC to the extent feasible, to reduce potential visibility and noise.
- An Unanticipated Discovery Plan will be implemented that will include stop-work and notification procedures to be followed if potentially significant MARs or cultural resources are encountered or inadvertently disturbed during construction.

4.5 TOPOGRAPHY, GEOLOGY, SOILS, AND GROUNDWATER

This section provides a detailed description of the existing topography, geology, soils, and groundwater conditions present along the SRWEC-NYS, Onshore Transmission Cable, Onshore Interconnection Cable and at the Union Avenue Site. This section also discusses the potential impacts to topography, geology, soils, and groundwater as a result of the construction and operation of the Project, along with the methods that the Applicant will implement to avoid, minimize, and mitigate those potential impacts. Additional discussion of the marine physical conditions along the SRWEC-NYS is provided in Section 4.11, Marine Physical and Chemical Characteristics.

4.5.1 Existing Topography, Geology, Soils, and Groundwater Conditions

The section discusses the existing topographic, geologic, soils, and groundwater conditions. The following information is based on current public and unpublished data sources, including state and federal agency-published papers and databases; online data portals and mapping databases; environmental studies; and published scientific literature relevant to geological conditions; and the Project's geotechnical and geophysical (G&G) surveys as well as the benthic resources surveys conducted.

Topography

The bathymetry in the area of the SRWEC-NYS corridor is based on a review of NOAA mapping. Water depths, referenced as the mean low water datum, along the SRWEC-NYS corridor range from approximately 0 to 85 ft (0 to 26 m) within NYS waters (NOAA 1979).

The topography in the area of the Onshore Facilities is based on a review of the USGS topographic quadrangle for the Town of Brookhaven (see Revised Figure 4.5-1). The approximate topographic elevation along the Project ranges from 0 ft (0 m) above mean sea level (amsl) at the landfall at Smith Point County Park to approximately 140 ft (42 m) amsl at the Onshore Transmission Cable crossing of Waverly Avenue. Although a majority of the natural topography along the Onshore Transmission Cable can be defined as generally sloping to moderately sloping (*i.e.*, areas where topography has a general incline), instances of stronger slopes along the corridor are evident in areas along William Floyd Parkway and Horseblock Road as the cable travels further inland (see Revised Figure 4.5-1).

Geology

The geological conditions along the Project were developed by reviewing current public and unpublished data sources, including state and federal agency-published papers and databases; online data portals and mapping databases; environmental studies; and published scientific literature relevant to geological conditions. G&G surveys of the SRWEC–NYS were conducted in 2019 and 2020, and the finalized results of these surveys will be completed in 2021. Geotechnical studies for the Onshore Facilities will be conducted in 2021.

SRWEC–NYS

The principal geologic features of the inner continental shelf offshore of Fire Island and Smith Point and within NYS waters are described below. The Holocene-aged sediments found along the southern coast of Long Island are quartzose beach sand, dune sands and fine-grained sediments (Williams 1976). Holocene-age sands slightly coarser than the Pleistocene-age sand below may have been deposited as fluvial sand at the heads of estuaries before sea-level rise (Swift and Boehmer 1972) and winnowed. The blanket of Holocene-aged sands is generally between 3.3 and 10 ft (1 and 3 m) thick, gradually thickening seaward and eastward from Fire Island, but they have been reported to reach a thickness of 33 ft (10 m) on inlet ebb shoals and in large scale, linear sand ridges (Panageotou and Leatherman 1986). Holocene-aged sand thickness has been mapped in detail (Foster et al. 1999) forming a series of sand ridges oriented obliquely to the shoreline east of Fire Island Inlet (Bokuniewicz et al. 2011).

Investigations of the framework geology in the area demonstrated the importance of inner-shelf, shoreface-attached sand ridges that contribute sediment to the shoreface through erosion of the glacial outwash sands and gravels exposed by ravinement processes (Schwab et al. 2000, 2013, 2014a, 2014b). The location of the shoreface-attached sand ridges is correlated with areas of island stability in the central and western portion of Fire Island. USACE sand borrow areas have been identified in these central and western areas offshore of Fire Island and at the Moriches Inlet offshore location. Installation of the SRWEC–NYS will avoid these areas so that sand resources can be accessed for future beach renourishment projects along Long Island.

At the eastern end of Fire Island, where shoreface-attached sand ridges are absent, the shoreline exhibits net erosion and landward retreat (Schwab et al. 2014). Repeated seafloor mapping and modeling of flow patterns and sediment transport on the inner-shelf sand ridges show that while the short-term mixed current flow directions drive both offshore and onshore sediment transport, the dominance of

strong winds and current flow from the east result in a net western migration of the sand ridges and a shoreward flux of sediment in troughs between sand ridges (Schwab et al. 2014; USGS 2017).
The SRWEC–NYS corridor displays a high variation of sediment types from predominantly mixed sand to sandy mud and sand.

Boulder fields, predominantly of medium density, and sand waves were only identified in the nearshore area of the SRWEC–NYS. The Applicant has assumed a conservative maximum of 40 percent of the SRWEC–NYS corridor will require sand wave removal prior to cable installation. The actual number will be refined following the results of the ongoing geophysical and sediment mobility studies. Where required, the Applicant has assumed the SRWEC–NYS will be cleared of sand wave up to 98 ft (30 m) centered on the final centerline of a distinct export cable.

Preliminary geological characteristics along the SRWEC–NYS are provided in Appendix 4-G – Benthic Resources Characterization Report – New York State Waters. These may be refined during interpretation of additional G&G survey data, and final results will be presented in the Project EM&CP.

Onshore Facilities

The geology of Long Island is dominated by terminal moraines and glacial outwash deposits derived from Wisconsinan Laurentide glacial advance and retreat, accompanied by Holocene sea-level transgression, which eroded and redistributed outwash deposits to form the present barrier-island system (Schwab et al. 2014; USGS 2017).

The land mass of Long Island is also a product of glacial and post-glacial processes. The Wisconsin episode is predominantly responsible for the surficial geology of the modern Long Island region. During the Wisconsin glacial stage, an ice sheet moved to approximately the center of Suffolk County and stopped, leaving before it two terminal moraines, which are now known as the Ronkonkoma moraine and the Harbor Hills moraine. After the ice sheet reached its southern limits in Suffolk County, it began to melt. The melted water flowed into streams and carried a large volume of sand and gravel farther south. This sand and gravel were deposited in two relatively flat outwash plains; one between the Ronkonkoma moraine and the Atlantic Ocean and the other between the Harbor Hill moraine, which extends from the western edge of Nassau County, along the northern shore of Long Island, to its easternmost point at Fisher's Island, and the Ronkonkoma moraine (USDA 1975).

The Ronkonkoma moraine and the Harbor Hills moraine are parallel in the western half of Long Island but diverge near Peconic Bay. The Harbor Hill moraine and the Ronkonkoma moraine are comprised primarily of poorly sorted till, including sand, pebbles, rocks, and boulders, while the outwash plains located between the moraines, and south of the Ronkonkoma moraine, include varying amounts of well-sorted sand and gravel. The Ronkonkoma moraine was deposited as a terminal moraine at the end of a glacial lobe and forms the spine of Long Island (Sanders and Merguerian 1994). Streams draining southward at the edge of the glacier deposited an outwash plain of sandy material that is now the southern Long Island coastal zone and shore.

Fire Island is a 31 mi (50 km) long barrier island extending from Fire Island Inlet (Democrat Point) eastward to Moriches Inlet. This barrier island is part of a barrier system that runs parallel to the south shore of Long Island. These barriers are known to be migrating westward as sediment eroded from the Montauk Point area is carried by longshore currents. Sediments that nourish Fire Island are believed to come primarily from several sources. The eroding headland section of the Montauk Point area is a major source of sediment for the barrier islands, with offshore and inlet scouring contributing sources as well (Taney 1961).

The stratigraphy underlying the Holocene shoreline deposits and back-bay salt marshes consists of Pleistocene units unconformably overlying truncated Upper Cretaceous coastal plain deposits. The Coastal Plain Unconformity separates the lowermost Pleistocene deposits, known as the Gardiners Clay unit from the truncated strata of the Coastal Plain deposits, assumed to be the Cretaceous Magothy Formation. Near Smith Point, the thickness of the Quaternary deposits (*i.e.*, the Gardiners Clay, the Pleistocene outwash, and Holocene shoreface deposits) is mapped to be on the order of 49 to 98 ft (15 to 30 m) according to an analysis by Foster et al. (1999), which integrated onshore well logs with offshore seismic profiles. The bedrock under Suffolk County varies in depth from approximately 400 ft (121 m) below ground surface (bgs) along the northern coastline of the Town of Southold, to approximately 2,000 ft (609 m) bgs along the central part of the southern coastline of Fire Island.

A series of interconnected shallow inshore bays or lagoons separate the barrier islands from the mainland, known as the South Shore Estuary. This tidal estuarine environment consists of marshes, sand and mud flats, beds of submerged aquatic vegetation, and broad shallow areas lightly incised with deeper channels. Previous breaches have occurred and healed, leaving relict flood-tide sand deltas extending into the back-bay areas. The barrier islands typically vary between 984 and 2,625 ft (300 and 800 m) in width.

The shoreward face is constantly reworked by waves and tidal action, with a profile that changes seasonally and with severe weather events. Behind the beach facies are typically wind-blown dunes composed of fine to medium sands, which can reach a height of 13 to 23 ft (4 to 7 m). Behind the dunes may be a predominantly fresh-water wetland or salt-water tidal wetland, which then gives way to the shallow waters of the estuary. The beaches are composed of sands with little coarser gravels or cobbles present, except where the barrier beaches are closest to the mainland, where coarser materials may be more readily sourced from Pleistocene outwash deposits.

Soils

SRWEC–NYS

The Applicant conducted sediment grab samples and Sediment Profile and Plan View Imaging (SPI/PV) surveys to characterize the benthic environment along the SRWEC–NYS (Appendix 4-G). Bottom substrata composition was characterized using a combination of classifications, including Coastal and Marine Ecological Classification Standard (CMECS) Substrate Group obtained from Plan View (PV) images and sediment types derived from Sediment Profile Imaging (SPI) analyses, both of which informed CMECS Substrate Subgroup classifications.

Along the SRWEC–NYS, CMECS Substrate Subgroup, a variable incorporating information from both the PV and SPI, ranged from Very Fine Sand to Medium Sand, with no gravel documented. The predominant CMECS Substrate Subgroups characterized along the SRWEC–NYS were Very Fine Sand or Fine Sand; this mirrored the results documented by sediment type (Figure 4.8-1). Straight and sinuous sand ripples occurred at the SPI/PV stations close to shore. Macrohabitat types were generally similar across the stations along the SRWEC–NYS corridor, consisting of sand, sand with ripples, or sand and mud. A distinct darker surficial layer was observed at many of the sandy shallow stations. This was likely an indication of benthic microalgae, as photosynthetically active radiation penetrates through the water column and has the potential to reach the seafloor. Sand dollars were frequently observed and were likely grazing on benthic microalgae.

Onshore Facilities

The soils along the Onshore Facilities were characterized in accordance to the Soil Survey of Suffolk County, New York (USDA 1975) (the Soil Survey), in which soils were classified according to distinct characteristics and placed accordingly into series and mapping units. A series is a group of mapping units formed from partly disintegrated and partly weathered rocks that lie approximately parallel to the surface and that are similar in arrangement and differentiating characteristics, such as color, structure, reaction, consistency, mineralogical composition, and chemical composition. Mapping units differ from each other according to slope and may differ according to characteristics, such as texture. The Natural Resources Conservation Service (NRCS) Mapped Soils identified within 500 ft (152 m) along the Onshore Transmission Cable, around the Union Avenue Site and along the Onshore Interconnection Cable are shown in Revised Figure 4.5-2 and identified in Revised Table 4.5-1.

Revised Table 4.5-1. NRCS Mapped Soils at and along Onshore Facilities

Soil Types	Slope	Depth to Water Table (cm)	Drainage	Hydric Group	Hydric Rating	Percentage within 500 ft (Percent)
Onshore Transmission Cable						
Atsion (At)		15	Poorly drained	A/D	Yes	0.2
Carver and Plymouth sands (CpA)	0 to 3 percent slopes	201	Excessively drained	A	No	3.3
Carver and Plymouth sands (CpC)	3 to 15 percent	201	Excessively drained	A	No	2.3
Carver and Plymouth sands (CpE)	15 to 35 percent	201	Excessively drained	A	No	0.1
Cut and fill, gently sloping (CuB)	-	201	Moderately well drained	-	No	1.8
Cut and fill, sloping (CuC)	-	201	Moderately well drained	-	No	0.5
Fill land, dredged materials (Fd)	-	201	-	-	Unranked	4.8
Gravel pits (Gp)	-	201	-	-	Unranked	0.0
Haven loam (HaA)	0 to 2 percent	201	Well drained	B	No	6.5
Hooksan-Urban land complex (HU)	0 to 8 percent	201	Excessively drained	A	No	0.4
Plymouth loamy sand (PlA)	0 to 3 percent	201	Excessively drained	A	No	22.9
Plymouth loamy sand (PlB)	3 to 8 percent	201	Excessively drained	A	No	4.0
Plymouth loamy sand (PlC)	8 to 15 percent	201	Excessively drained	A	No	0.6
Recharge Basin (Rc)	-	201	-	-	Unranked	0.4
Riverhead sandy loam (RdA)	0 to 3 percent	201	Well drained	A	No	38.2
Riverhead sandy loam (RdB)	3 to 8 percent	201	Well drained	A	No	4.7
Riverhead sandy loam (RdC)	8 to 15 percent	201	Well drained	A	No	0.0
Riverhead and Haven soils (RhB)	0 to 8 percent	201	Well drained	A	No	3.2
Tidal marsh (TM)		0	Very poorly drained	-	Yes	0.6
Urban (Ur)		201	-	-	Unranked	1.4
Water (W)		201	-	-	Unranked	3.4
Walpole, sandy loam (Wd)	0 to 3 percent	5	Poorly drained	B/D	Yes	0.0
Wareham loamy sand (We)		15	Poorly drained	A/D	No	0.1
OnCS-DC						
Carver and Plymouth sands (CpA)	0 to 3 percent	201	Excessively drained	A	No	70.3
Carver and Plymouth sands (CpC)	3 to 15 percent	201	Excessively drained	A	No	9.4

Soil Types	Slope	Depth to Water Table (cm)	Drainage	Hydric Group	Hydric Rating	Percentage within 500 ft (Percent)
Gravel pits (Gp)	-	201	-	-	Unranked	3.9
Plymouth loamy sand (PlA)	0 to 3 percent	201	Excessively drained	A	No	5.3
Plymouth loamy sand (PlB)	3 to 8 percent	201	Excessively drained	A	No	11.1
Onshore Interconnection Cable						
Carver and Plymouth sands (CpA)	0 to 3 percent	201	Excessively drained	A	No	31.7
Carver and Plymouth sands (CpC)	3 to 15 percent	201	Excessively drained	A	No	38.4
Carver and Plymouth sands (CpE)	15 to 35 percent	201	Excessively drained	A	No	2.1
Cut and fill, gently sloping (CuB)	-	201	Moderately well drained	-	No	10.5
Cut and fill, sloping (CuC)	-	201	Moderately well drained	-	No	1.6
Plymouth loamy sand (PIA)	0 to 3 percent	201	Excessively drained	A	No	15.7

The predominant soil series found along the Onshore Transmission Cable are the Plymouth and Riverhead series, while at the Union Avenue Site, the predominate soil series is the Carver series. These series are described in more detail below.

Carver Series

The Carver series consists of deep, excessively drained, coarse-textured soils that form throughout Suffolk County on rolling moraines and broad outwash plains. Slopes in this soil series range from 0 to 35 percent. Native vegetation is white oak, black oak, scrub oak, and pitch pine.

In a representative profile, a thin layer of leaf litter and partly decayed organic matter is on the surface. Below this is a surface layer of dark-gray sand approximately 3 inches (in) (8 centimeters [cm]) thick. The subsurface layer is gray or light-gray loose sand to a depth of approximately 22 in (56 cm). The subsoil is brown in the upper part and strong brown in the lower part, and consists of loose sand to a depth of approximately 22 in (56 cm). The substratum is loose sand that contains some gravel and extends to a depth of approximately 60 in (152 cm). The substratum is light yellowish brown to brow-yellow to a depth of approximately 31 in (79 cm). Below this, the soil is light yellowish brown.

Carver soils have very low available moisture capacity and natural fertility is very low. Permeability is rapid throughout.

Plymouth Series

The Plymouth series consists of deep, excessively drained, coarse-textured soils that formed in a mantle of loamy sand or sand over thick layers of stratified coarse sand and gravel. These nearly-level-to-steep soils are throughout Suffolk County on broad, gently-sloping-to-level outwash plains and on undulating to steep moraines. Native vegetation consists of white oak, black oak, pitch pine, and scrub oak.

In a representative profile, the surface layer is very dark grayish-brown loamy sand, approximately 4 in (10 cm) thick, in wooded areas. In cultivated areas, the surface layer is mixed with material formerly in the upper part of the subsoil, and there is a brown to dark-brown plow layer of loam approximately 10 in (25 cm) thick. The subsoil is yellowish-brown and brown, very friable and loose loamy sand to a depth of about 27 in (69 cm). The substratum, to a depth of about 58 in (147 cm), is yellowish-brown, loose gravelly coarse sand.

Plymouth soils have low-to-very-low available moisture capacity. Natural fertility is low. Internal drainage is good. Permeability is rapid in all these soils except in those of the silty substratum phase. Permeability is moderate in the silty layer of soils in the silty substratum phase.

Riverhead Series

According to the Soil Survey, the Riverhead series consists of deep, well-drained, moderately coarse textured soils that formed in a mantle of sandy loam or fine sandy loam over thick layers of coarse sand and gravel. These soils occur in rolling to steep areas on moraines and in level to gently sloping areas on outwash plains across. Native vegetation consists of black oak, white oak, red oak, and scrub oak.

A representative profile of this series identifies the surface layer is brown-to-dark-brown sandy loam about 12 in (30 cm) thick. The upper part of the subsoil, to a depth of approximately 27 in (68 cm), is strong-brown, friable sandy loam. The lower part of the subsoil is yellowish-brown, very friable loamy sand to a depth of approximately 32 in (81 cm). Below is a yellowish-brown, friable gravelly loamy sand layer to a depth of approximately 35 in (89 cm). The substratum is very pale brown and brown loose sand and gravel or sand to a depth of 65 in (165 cm).

Riverhead soils have moderate-to-high available moisture capacity. Internal drainage is good. Permeability is moderately rapid in the surface layer and in the subsoil and very rapid is the substratum. Natural fertility is low.

Groundwater

Long Island is considered a sole source aquifer region, meaning groundwater is the single drinking water source. According to the NYSDEC, "the Long Island aquifers are among the most productive aquifers in the country" (NYSDEC 2020b). The three major hydrogeologic units of the Long Island aquifers are the Upper Glacial Aquifer, the Lloyd Aquifer, and the Magothy Aquifer (NYSDEC 2020c).

Groundwater flow on Long Island is characterized by a groundwater divide, extending east-west along the length of the Island corresponding with the topographically higher land surface altitudes (Como et al. 2018). To the north of the groundwater divide, horizontal groundwater flow is generally to the north; in areas south of the divide, groundwater flows toward the south. Groundwater flows generally to the south, toward the Atlantic Ocean (Como et al. 2018). Depth to groundwater is generally greater than 200 cm across the Onshore Transmission Cable corridor, except at the water's edges at stream crossings (see Revised Figure 4.5-3).

The USGS maintains five active groundwater monitoring wells located in the vicinity of the Onshore Facilities. Four of the five well sites (ID #404806072553802, 404358072520302, 404357072515702, and 404357072515703) are located approximately 0.1 mi (0.2 km) from the Onshore Transmission Cable, and one of the well sites (ID #404642072520001) is located approximately 0.01 mi (0.02 km) from the Onshore Transmission Cable. Water levels in these three five active wells nearest to the Onshore Facilities have been categorized as "normal" and "above normal" (USGS 2019), and the Project infrastructure is not expected to cross any sensitive source water protection areas.

The Suffolk County Water Authority (SCWA) provides residents and businesses with water pulled from the groundwater sources. The Project traverses SCWA Distribution Area 1 and 20, with a total of 150 active wells (SCWA 2020).

4.5.2 Potential Topography, Geology, Soils, and Groundwater Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to topography, geology, soils, and groundwater.

Potential Construction Impacts and Proposed Mitigation

This section evaluates potential construction impacts to topography, geology, soils, and groundwater expected to result from the installation of the Project and presents proposed mitigation measures, as applicable.

Topography

As discussed in Section 4.5.1, topographic slope along a majority of the Onshore Transmission Cable is defined as moderately sloping, but areas of steeper slopes will be encountered in areas along existing the Town of Brookhaven roadways. However, as the Onshore Transmission Cable has been designed and sited within existing roadway ROWs, the Project avoids construction across high points, ridge lines and steep slopes.

Construction of the Onshore Transmission Cable and Onshore Interconnection Cable will involve trenchless construction methods as well as conventional, trenching, and excavation. Trenching for transmission duct banks will generally be excavated in and along the sides of roads and will be restored by backfill operations. In areas where grading and the excavation of previously disturbed soils is required, existing drainage patterns will be maintained unless otherwise agreed upon in consultation with Suffolk County or the Town of Brookhaven DPWs. Project construction is not expected to result in significant topographic alterations and thus not significantly change stormwater runoff patterns or volumes. Temporary erosion control measures (*e.g.*, hay bale and/or silt fence barriers and the protection of soil stockpiles) will be utilized, as outlined in the SWPPP to be prepared for the Project as part of the Project EM&CP. Additionally, BMPs will be utilized to stabilize areas where more moderate slopes are encountered. Following the installation of the Onshore Transmission Cable along road and utility ROWs, disturbed areas of more moderate slopes will be restored to pre-construction conditions unless otherwise agreed upon in consultation with Suffolk County or the Town of Brookhaven DPWs and, as such, the existing topography along the road ROWs will be maintained.

The construction of the OnCS-DC will include general site preparation and grading. Grading at the OnCS-DC will ensure adequate drainage and ensure that the site is graded appropriately to reduce impacts from water accumulation. The OnCS-DC design will consider the potential effects of erosion, high winds, and ice. The final foundation design and equipment layout may vary based on site specific geotechnical evaluations and subsequent engineering design. Temporary environmental erosion controls such as swales and erosion control socks will be installed in accordance with BMPs as outlined in the SWPPP to be prepared as part of the Project EM&CP. These controls will be maintained until the site is restored and stabilized. Disturbed areas outside the final site footprint will be restored.

Geology

Construction of the SRWEC-NYS will result in temporary seafloor disturbance and sediment suspension and deposition. Impacts to geologic resources during construction of the SRWEC-NYS will be limited to the mechanical cutter, mechanical plow (which may include a jetting system), and/or jet plowing of the seafloor during cable installation. While impacts to Holocene deposits consisting of medium to coarse sand with some gravel resources are anticipated from the SRWEC-NYS installation, HDD techniques will minimize impacts to surficial sediments, compared to open trench installation. Also, measurable impacts to geologic resources from the SRWEC-NYS installation, including the HDD process, will be limited for the overall geologic resources and processes in the area. The temporary exit pits installed nearshore for the HDD installation will result in short-term and localized impacts to Holocene sediments, but no permanent or long-term impact to geologic resources are expected.

According to the results of the sediment transport model, sediment will be disturbed and temporarily suspended during installation of the SRWEC–NYS (Appendix 4-H - Hydrodynamic and Sediment Transport Modeling Report – New York State Waters). The model predicted that sediment suspension and deposition resulting from installation of the SRWEC–NYS will be limited to the area immediately adjacent to the burial route. Localized impacts to marine deposits would be short-term and temporary.

Sediment suspension and deposition from excavation of the HDD exit pits are predicted to occur within a very small radius of the activity. Any localized impacts to marine deposits will be short-term and temporary. From the perspective of geological conditions, impacts from leveling of sand waves and movement of boulders will be limited, as the overall stratigraphy of the geologic deposits will not be significantly altered.

Construction of the Onshore Transmission Cable to the Union Avenue Site will originate at the TJB on the eastern portion of Smith Point County Park at Fire Island with a second HDD crossing under the ICW via the ICW HDD. The Onshore Transmission Cable will then follow previously disturbed areas within and along roadways to the Union Avenue Site. Construction of the Onshore Transmission Cable and Onshore Interconnection Cable will involve site preparation, trench excavation, duct bank and vault installation, cable installation, cable jointing (splicing), final testing and restoration, with additional steps associated with HDD and other trenchless crossing methods. Following construction, surface grades will be stabilized and returned to pre-construction conditions where practicable in coordination with the County and Town DPW. Overall, there will be short-term, direct impacts to geological conditions during construction activities. All construction activities will be conducted in compliance with the SPDES General Permit and the SWPPP prepared as part of the Project EM&CP, which require erosion and sediment control management minimizing any adverse effects associated with sediment suspension and deposition.

The OnCS–DC will be designed to consider existing geological conditions. Construction will affect surficial geologic resources but not to such an extent that there will be a perceptible change in the overall regional geological conditions. On-site construction activities will be conducted following the SWPPP prepared as part of the Project EM&CP.

Soils

Up to two TJBs will be installed within Smith County Park at the connection from the SRWEC–NYS to the Onshore Transmission Cable. TJB disturbance will extend 13 ft (4 m) below grade with a temporary disturbance at the surface of 0.03 acres (0.01 ha).

The Onshore Transmission Cable and Onshore Interconnection Cable will be sited within previously disturbed and existing roadway and utility ROWs to the extent practicable. Previously disturbed areas within and along roadways will be excavated and trenched for burial of the cable and vaults resulting in the mixing of the existing soil horizons. Trenches for the duct banks will generally be located within the ROW of existing paved roadways. Duct bank disturbance will extend 3 to 6 ft (1 to 2 m) below grade, with the width of temporary disturbance of 30 ft (9.1 m). Splice vaults will be installed approximately every 1,800 to 2,200 ft (549 to 671 m) and will result in temporary disturbance of 50 ft by 40 ft (15 m by 12 m) horizontal and a depth of up to 15 ft (4.6 m) at each splice vault. Following installation, surface grades will be stabilized and returned to pre-construction conditions where practicable in coordination with the County and Town DPW.

Following the installation of the Onshore Transmission Cable and Onshore Interconnection Cable, disturbed areas will be stabilized, and excavated soils will be examined to determine their suitability for reuse on-site and, where reuse is not possible, excavated soils will be disposed of at a licensed facility.

The maximum area of land disturbance during the construction of the OnCS-DC is approximately 7 acres (2.8 ha) at the OnCS-DC. Equipment and structures for the OnCS-DC will be supported on foundations expected to be of concrete and will be of a design suitable for existing soil conditions. The majority of the site equipment will require shallow foundations, 4 to 5 ft (1.2 to 1.5 m) in depth based on the expected equipment size. Larger structures may require drilled shaft equipment foundations of 12 to 30 ft (4 to 9 m) in depth. Onsite construction activities will be conducted in compliance with the SPDES General Permit and SWPPP prepared as part of the Project EM&CP.

Groundwater

Based on the depth to groundwater along the Project, as described in Section 4.5.1.4, impacts to groundwater during construction of the Project are not anticipated.

The Onshore Transmission Cable and Onshore Interconnection Cable will be sited within previously disturbed and existing ROWs to the extent practicable. Dewatering during construction activities is not anticipated, however, should it be required any dewatering in excavated and/or trenched areas will be properly managed by appropriate control measures and will be described in the Project EM&CP.

Where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids that may impact groundwater resources in the localized area. Any unanticipated discharges or releases within the Onshore Transmission Cable during construction are expected to result in minimal, temporary impacts;

activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Potential Operational Impacts and Proposed Mitigation

Potential operational impacts associated with the Project will be temporary and localized with respect to topography, geology, soils, and groundwater but are not expected to create any significant changes to the Project area.

Impacts to topography, geology, soils, and groundwater from operation of the SRWEC–NYS are not anticipated. If mechanical damage to the SRWEC–NYS should occur, repair of the cable may result in disturbance to the seafloor from maintenance vessels and activities and sediment suspension and deposition causing localized, temporary impacts.

Operation of the Onshore Facilities will include an OnCS–DC operational footprint size of up to approximately 7 acres (2.8 ha) and permanent subsurface disturbance associated with installation of the duct bank, splice vault, and TJBs at the surface. Impacts may occur during the operational phase in the event that the Onshore Transmission Cable or Onshore Interconnection Cable require repair or replacement. These short term impacts would be less than the disturbances associated with the construction phase and generally confined to previously-disturbed locations.

Proposed Environmental Protection Measures

As discussed throughout this section, the Applicant will implement the following environmental protection measures to reduce potential impacts on topography, geology, soils, and groundwater. These measures are based on protocols and procedures successfully implemented for similar projects.

- Onshore Facilities are primarily sited within previously disturbed and developed areas (*e.g.*, roadway and utility ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts on topography, geology, soils, and groundwater.
- A SWPPP will be implemented to minimize erosion and sedimentation during construction through the use of BMPs such as and potential groundwater quality impacts during construction and operation of the Onshore Facilities.

4.6 TERRESTRIAL ECOLOGY AND WILDLIFE

In accordance with PSL § 122(1) (c) and 16 NYCRR § 86.5(a) and (b), this section describes: 1) the studies that were undertaken to evaluate the Project's potential impacts, if any, on terrestrial ecology and wildlife; and 2) the results of such studies. Where a potential impact has been identified, this section describes the minimization or mitigation measures that have been adopted during the siting and design process to avoid such impact(s), or where avoidance is not possible, to mitigate the impact to the maximum extent practicable.

The description of the existing conditions and assessment of potential impacts were developed by reviewing publicly available online data portals and GIS mapping databases (*e.g.*, USGS Protected Lands of the United States, NYSDOS Significant Coastal Fish and Wildlife Habitat [SCFWH] and NYSDEC Bird Conservation Areas, Critical Environmental Areas [CEA], Significant Natural Communities, New York Herp Atlas Project, NY IMap Invasives iMAP3.0, Listed Plant and Animal Species, New York State Breeding Bird Atlas 2000 to 2005 dataset [New York State Breeding Bird Atlas 2007], Martha's Vineyard bat telemetry studies [Dowling et al. 2017]; and Long Island northern long-eared bat (NLEB) (*Myotis septentrionalis*) telemetry surveys (NPS 2020) and acoustic surveys (NPS 2020), and through communications with federal, NYS and local agencies). The primary agency sources used include a an Official Species List provided by the USFWS Information generated through use of USFWS's Information for Planning and Consultation (IPaC) database review on March 11, 2020 and on March 30, 2021. A NYNHP Project-specific inquiry request was filed on March 4, 2021; a response was not received by the time this Revised Exhibit was prepared. Meetings with NYSDEC and USFWS as described in Updated Appendix 1-B also informed the existing conditions and assessment of potential impacts.

The SRWEC–NYS is predominately located in NYS waters but will make landfall within coastal habitat at the within Smith Point County Park on Fire Island (the Landfall Work Area). Further, the ICW HDD that will require work areas in both Smith Point County Park and Smith Point Marina on the mainland (ICW Work Area). In this section, the term Landfall/ICW Study Area is used to describe an area encompassing the Landfall Work Area, the adjacent HDD conduit stringing area, the ICW Work Area, as well as the adjacent lands around these areas to allow for the possibility of future design adjustments. The term Landfall/ICW Study Area on Fire Island is used to specifically describe the assessed areas on Fire Island, while the term Landfall/ICW Study Area on the Mainland is used to specifically describe the assessed areas within Smith Point Marina (see Revised Figure 4.7-1).

Subtidal habitats that may occur in the ICW, such as submerged aquatic vegetation (SAV), are addressed in Section 4.8, Benthic and Shellfish Resources. More detailed information concerning coastal and terrestrial habitat, including the results of NYSDEC and USFWS data requests and desktop assessment, is presented in Appendix 4-E – Onshore Ecological Assessment and Field Survey Report and Appendix 4-E Addendum – Onshore Ecological Desktop Assessment.

4.6.1 Existing Terrestrial Ecology and Wildlife Conditions

Terrestrial Vegetation

Central Long Island's coastal and terrestrial environment varies widely and consists of a diversity of habitats. These range from exposed rocky shores and exposed bedrock, sandy coastal beaches, dunes, freshwater and brackish bays and ponds, and salt marshes fringing the shore of sheltered embayments to intertidal mudflats and sandflats (BOEM 2013a). The sandy, coastal beaches along the southeastern coastline of Long Island are characterized by four zones: nearshore bottom (submerged areas below mean low water to 29.5 ft [9.0 m]); foreshore (intertidal areas between mean low water to the high tide zone); backshore (exposed sandflats above high tide line to dunes, but occasionally submerged during storms or exceptionally high tides); and dunes (areas of wind-blown sand ridges or mounds above the highest tide line and exposed to wind action) (USFWS 1997). These coastal habitats are constantly changing as a result of wave action and tidal currents which remove, transport, and deposit sediment (MMS 2007). The primary sources of deposited material, which maintain the sand beaches, is from erosional areas along existing beaches and sand shoals on the inner continental shelf (BOEM 2013a). In 2012, Hurricane Sandy's wave energy and storm surge produced extensive coastal erosion along the entirety of Fire Island. Beaches and dunes across the island lost an average of 54 percent of their pre-storm volume with greater than 75 percent volume loss estimated near the Landfall/ICW Study Area on Fire Island (USGS 2013).

On Fire Island, American beachgrass (*Ammophila breviligulata*) is the dominant plant species on foredunes. Beach plum (*Prunus maritima*), bayberry (*Myrica pennsylvanica*), seaside goldenrod (*Solidago sempervirens*), and poison ivy (*Toxicodendron radicans*) commonly occur on the leeward side (NPS 2015). Interdunal swales, found mostly in the Otis Pike Fire Island High Dune Wilderness Area located west of the Landfall/ICW Study Area on Fire Island, are wetlands that form when blowouts in the dunes intersect the water table and typical wetland plants such as grasses, forbs and woody shrubs become established. Characteristic species of these swale wetlands include purple gerardia (*Agalinis purpurea*), sundews (*Drosera* spp.), cranberry (*Vaccinium macrocarpon*), highbush blueberry (*Vaccinium corymbosum*), and bayberry. Tidal marshes occupy the backside of Fire Island in broad areas where historic storms have overwashed adjacent upland materials. Common species of Fire Island's tidal marshes are smooth cordgrass (*Spartina alterniflora*), salt meadow grass (*Spartina patens*) and spike grass (*Disticlis spicata*) depending on the level of tidal inundation.

On mainland Long Island, residential and industrial development has removed or degraded much of the historical natural communities (see Revised Figure 4.6-1). One exception is the Central Pine Barrens, a 105,000-acre (42,492 ha) area of unique forested and wetland habitats protected by the Long Island Pine

Barrens Protection Act in 1993. In addition, the headwaters for the Carmans River, which intersects with the Onshore Transmission Cable corridor and is one of the four major rivers on Long Island, is located in the Central Pine Barrens. The river is freshwater where the Onshore Transmission Cable crosses along Victory Avenue with brackish conditions beginning approximately 2,500 ft (762 m) downstream where a railroad crossing is located.

Terrestrial habitat adjacent to the Onshore Transmission Cable and Union Avenue Site largely consists of developed residential, industrial, or commercial land uses, with the exception of forested wetlands and watercourses at the Carmans River crossing. The Onshore Interconnection Cable is located generally within paved portion of existing roadway or utility-owned or controlled property. The Union Avenue Site is primarily a developed industrial/commercial site with small narrow forested areas along parcel boundaries.

Significant and Critical Natural Communities and Habitats

Critical Environmental Areas

CEAs are specific locations in a town, village, city, county, or NYS that have identified because they provide characteristics of a benefit to human health, have an important or unique natural setting, hold important agricultural, social, cultural, historic, recreational value or have an inherent ecological, geological or hydrological sensitivity (NYSDEC 2020a). The Project intersects two CEAs, the Coastal Zone Area South and the Central Pine Barrens.

Coastal Zone Area South

The Coastal Zone Area South CEA has been designated by the Town of Brookhaven to protect public health, open space, and wetlands. The Onshore Facilities within this CEA have been largely located within existing developed areas including parking lots and paved roadways. A portion of the Landfall/ICW Study Area intersects the Coastal Zone Area South CEA on the mainland. In addition, the Onshore Transmission Cable traverses the Coastal Zone Area South CEA in an approximately 1.0 mi (1.6 km) segment along William Floyd Parkway from the ICW Work Area to the intersection of William Floyd Parkway and Fawn Place as well as an approximately 0.7 mi (1.1 km) segment at the Carmans River crossing.

Central Pine Barrens

The Long Island Pine Barrens Protection Act established an approximately 105,000-acre (42,492 ha) region on Long Island in 1993. The region is divided into two distant sub-regions, the CPA and the CGA (CPB 2020). In general, land use of the region addresses preservation of the pine barren ecosystem and water quality as well as addressing development patterns, land use categories, and agricultural, recreational, and human uses. Development activities within the region are regulated by the Central Pine

Barrens Joint Planning and Policy Commission (Central Pine Barrens Joint Planning and Policy Commission 2012). Where the Onshore Transmission Cable crosses the Carmans River it will be located within the CPA (see Revised Figure 4.7-2).

Significant Coastal Fish and Wildlife Habitats

NYS SCFWH are NYSDOS-designated special coastal and terrestrial habitat areas that are mapped and presented with a technical narrative providing site-specific information (NYSDOS 1984). The habitat narrative constitutes a record of the basis for the SCFWH's designation and provides specific information regarding the fish and wildlife resources that depend on the area. SCFWHs are provided protection through state regulations including the Tidal Wetlands Act (Article 25), Freshwater Wetland Act (Article 24), Protection of Waters Program (Article 15) and Wild, Scenic and Recreational Rivers System (Article 15, Title 27).

There were four SCFWHs identified during NYSDEC's Project review: Great South Bay-East, Smith Point County Park, Moriches Bay, and Carmans River (Revised Table 4.6-1 and Revised Figure 4.7-2).

The Great South Bay–East SCFWH is identified as the largest protected, shallow, coastal bay in NYS, providing feeding and nesting habitat for several threatened and endangered avian species, and supporting one of the largest concentrations of wintering waterfowl in NYS (NYSDEC 2008b).

The Smith Point County Park SCFWH is identified as one of the largest segments of an undeveloped barrier beach ecosystem on Long Island, providing feeding and nesting habitat for several threatened and endangered avian species, and supporting populations of threatened and endangered plant species such as seabeach amaranth (*Amaranthus pumilus*) and seabeach knotweed (*Polygonum glaucum*). The dunes also comprise a significant segment of the fall migration corridor for raptors (NYSDEC 2008a).

The Moriches Bay SCFWH abuts the bayside of the Landfall Work Area and ICW Work Area on Fire Island. It is identified as one of the largest, protected, shallow, coastal bays in NYS, providing feeding and nesting habitat for several threatened and endangered avian species, and supporting significant concentrations of wintering waterfowl. It is a highly productive bay and supports regionally significant habitat for fish and shellfish, migrating and wintering waterfowl, colonial nesting waterbirds, beach-nesting birds, migratory shorebirds, raptors, and rare plants (NYSDEC 2008c).

Carmans River is mapped as a SCFWH, and is noted for providing habitat for rare listed species, including peregrine falcon (*Falcos peregrinus*), eastern tiger salamander (*Ambystoma tigrinum*), eastern box turtle (*Terrapene carolina*), osprey (*Pandion haliaetus*), and potentially pied-billed grebe (*Podilymbus podiceps*). The river also supports concentrations of sea-run brown trout (*Salmo trutta*) and wild brook trout (*Salvelinus fontinalis*) in some segments of the river (NYSDEC 2008).

Significant Natural Communities

Significant natural communities are locations within NYS that contain rare or high-quality wetlands, forests, grasslands, ponds, streams and other types of habitats, ecosystems and ecological areas (NYSDEC n.d.[q]). The March 27, 2020 NYNHP letter identified five significant natural community types associated with the Project: Maritime Beach, Marine Eelgrass Meadow, Red Maple – Blackgum Swamp, Brackish Tidal Marsh, Marine Back-barrier Lagoon (Revised Table 4.6-1 and Revised Figure 4.7-2); of these, due to the revised routing of the Onshore Transmission Cable to utilize Victory Avenue, only Maritime Beach, Marine Eelgrass Meadow and Marine Back-barrier Lagoon are currently associated with the Project. Additional descriptions of the significant natural communities are presented in Appendix 4-E and Appendix 4-E Addendum.

Revised Table 4.6-1. NYSDOS Significant Coastal Fish and Wildlife Habitats and NYNHP Rare Natural Communities.

Project Element	SCFWH	NYNHP Natural Communities
Landfall/ICW Work Area	Smith Point County Park, Great South Bay-East (adjacent), Moriches Bay (adjacent)	Maritime Beach, Marine Eelgrass Meadow (adjacent), Marine Back-barrier Lagoon (adjacent)
Onshore Transmission Cable	Carmans River	None
Union Avenue Site	None	None
Onshore Interconnection Cable	None	None

Terrestrial Wildlife

The following sections discuss terrestrial wildlife species that could be associated with the four Project elements listed in Revised Table 4.6-1.

Birds

Coastal habitats associated with the Landfall Work Area and ICW Work Area include the habitats from the ocean inland, including foreshore, backshore, dune, and interdunal areas at the Landfall/ICW Study Area on Fire Island and on the mainland that could provide nesting and feeding areas for beach-nesting birds. These habitats provide nesting and feeding areas for birds in addition to rare beach and dune communities and plants. Where the SRWEC–NYS makes landfall, all proposed cable routes intersect with Maritime Beach, a rare and significant NYS coastal natural community. Additionally, HDD conduit stringing may be assembled on the beach; this action would require welding and short-term placement (*i.e.*, 2–3 weeks per duct) of assembled HDD conduit sections in approximately 3,500 ft (1,067 m) of coastal habitats (including Maritime Beach) before installation via HDD. Maritime Beach is a sparsely vegetated community dominated by beach grass. It occurs on unstable sand, gravel, or cobble shores above the mean high tide line and is continually modified through wave and wind action (Edinger et al. 2014; NYSDEC 2008b).

The terminus of each Landfall is located in developed areas of the Smith Point County Park parking lot or associated surface roads. If assembled on the beach, HDD conduit stringing activities would occur within the Smith Point County Park SCFWH described above.

On mainland Long Island, residential and industrial development has removed or degraded much of the historical natural communities. The Wertheim NWR located in the vicinity of the Project provides habitat for resident wildlife species in addition to numerous migratory songbirds, raptors, and waterfowl.

Table 4.6-2 lists the avian taxonomic groups that may occur within the SRWEC–NYS corridor and Onshore Transmission Cable corridor, based on observations made during regional avian studies for which survey areas overlapped with the Project as well as known natural history information.

Table 4.6-2. Timing, Distribution, and Status of Avian Species Groups Likely to Occur within the Landfall/ICW Work Area, SRWEC–NYS Corridor and Onshore Transmission Cable Corridor

Taxonomic Group	Seasonal Use	Primary Seasons	Location a/	General Abundance b/
Marine birds				
loons	migrant, winter resident	fall, winter	nearshore	common
grebes	migrant, winter resident	winter	nearshore	occasional
cormorants	summer breeder; winter resident	summer, fall, winter	nearshore	common (exc. great cormorant, occasional in winter)
sea ducks	winter resident	winter	nearshore	common
Coastal birds				
geese, bay ducks, dabblers	migrant, winter resident	fall, winter	nearshore	common
shorebirds	breeding, migrant	summer, fall	nearshore, onshore	common
wading birds	breeding, migrant	spring, summer	nearshore, onshore	common
gulls	breeding, migrant, winter resident	year round	nearshore, onshore	abundant
terns and skimmers	breeding, migrant	summer, fall	nearshore, onshore	common
Land birds				
raptors, passerines and woodpeckers, and game birds	breeding, migrant, winter resident	spring, summer	onshore (and nearshore during migration)	common

Taxonomic Group	Seasonal Use	Primary Seasons	Location a/	General Abundance b/
NOTES: a/ Nearshore = waters < 3 nm to the shoreline, may occur within the SRWEC-NYS as it approaches land; Onshore = on land, may occur at the shoreline or further inland. b/ Abundant = occurring regularly in greater numbers relative to other species during given season(s); Common = occurring regularly during given season(s); Occasional = occurring infrequently during given season(s) and in relatively small numbers; Uncommon = occurring very infrequently in given season(s), may occur sporadically in small numbers; Rare = very seldom occurring. SOURCES: Normandeau and APM 2019e; Paton et al. 2010; Viet and Perkins 2014; Veit et al. 2016; Winiarski et al. 2012.				

A wide variety of shorebirds, wading birds, waterfowl, passerines, and other land birds use the habitats of Fire Island, Narrow Bay, and Bellport Bay for stopover locations for foraging, sheltering, and/or breeding. Most shorebirds breed and forage along coastal beaches and occur offshore during migration. Waterfowl such as geese, bay ducks, dabbling ducks, and wading birds, such as herons and egrets, typically utilize inland, coastal, and wetland habitats, and occur offshore during migration.

Land birds that use the Landfall/ICW Work Area and Onshore Transmission Cable corridor include songbirds and raptors. Songbirds breed in a variety of upland and coastal habitats and are only present offshore during migration. Raptors, including accipiters, buteos, and harriers, may breed and forage in upland habitats, and pass through the area during migration. Falcons, osprey, and eagles may utilize coastal areas to breed, forage, and migrate.

SRWEC-NYS

As the SRWEC-NYS approaches the landfall location at Smith Point County Park, coastal marine birds are likely to dominate the species assemblages. Coastal birds typically forage within sight of land, while offshore species feed out of sight of land but within the Atlantic OCS. Truly pelagic species forage at the frontal zone along or beyond the continental shelf break (Furness and Monaghan 1987; Gaston 2004; Schrieber and Burger 2001), and thus will generally not use coastal waters and are unlikely to occur around the SRWEC-NYS corridor. Shallower waters within the SRWEC-NYS corridor provide foraging opportunities for terns, particularly the roseate tern (which feeds on sand lance), as well as sea ducks, loons, gulls, and cormorants. Terns and related species forage over shallow waters and sand spits nearshore in pursuit of small prey fish (Nisbet et al. 2017). Shorebirds will forage in the intertidal zones of beaches for invertebrates, small crustaceans, bivalve mollusks, small polychaete worms, insects, and talitrid amphipods (Macwhirter et al. 2002). Gulls may feed on small fish and invertebrates in intertidal and beach habitats (Nisbet et al. 2020).

Onshore Facilities

Most of the Onshore Facilities occur adjacent to marginal or unsuitable habitat for breeding birds. Habitats adjacent to the Onshore Facilities include marsh and terrestrial wetlands where wading birds may occur; and riparian zones, residential, woodland, small fields, and other upland habitats where passerines and raptors occur. Terrestrial wetlands and upland habitats are used for foraging, breeding, and roosting by wading birds, raptors, passerines and other common land birds.

According to the USFWS Official Species List, three federally listed bird species "may occur within the boundary of [the] proposed project and/or may be affected by [the] proposed project"; these include the federally threatened piping plover (*Charadrius melodus*), federally threatened red knot (*Calidris canutus rufa*), and the federally endangered roseate tern (*Sterna dougallii gougallii*). The Project is not within Critical Habitat for these species. The 2020 NYNHP response letter indicated two additional species, the NYS-listed threatened least tern (*Sternula antillarum*), and NYS-listed threatened common tern (*Sterna hirundo*), "on or very near the proposed cable routes and landfall locations at Fire Island and Smith Point County Park". Hairy-necked tiger beetle (*Cincindela hirticollis*), an unlisted but critically imperiled insect species in NYS, is known to occur on Fire Island Great South Beach.

Mammals

Twenty-three non-bat terrestrial mammal species are known to occur on Long Island (Connor 1971; USACE 2004; Table 4.6-3). All species listed in Table 4.6.3 are considered common except one species, New England cottontail (*Sylvilagus transitionalis*), which is a NYS Species of Special Concern and High Priority State Species of Greatest Conservation Need (NYSDEC 2015a, 2015b). Based on available urban, suburban, and undeveloped habitat present, 22 common, non-listed species could occur within or proximate to the Onshore Facilities (Table 4.6-3.)

Table 4.6-3. Non-bat Terrestrial Mammal Species on Long Island that Could Occur Within or Proximate to the Onshore Facilities

Common Name	Scientific Name	Status
eastern chipmunk	*Tamias striatus*	NL
eastern cottontail	*Sylvilagus floridanus*	NL
eastern gray squirrel	*Sciurus carolinensis*	NL
eastern mole	*Scalopus aquaticus*	NL
house mouse	*Mus musculus*	NL
long-tailed weasel	*Mustela frenata*	NL
masked shrew	*Sorex cinereus*	NL
meadow jumping mouse	*Zapus hudsonius*	NL
meadow vole	*Microtus pennsylvanicus*	NL

Common Name	Scientific Name	Status
mink	*Mustelka vison*	NL
muskrat	*Ondatra zibethicus*	NL
New England cottontail	*Sylvilagus transitionalis*	SSC, SGCN-HP
Norway rat	*Rattus norvegicus*	NL
opossum	*Didelphius marsupialis*	NL
raccoon	*Procyon lotor*	NL
red fox	*Vulpes vulpes*	NL
short-tailed shrew	*Blarina brevicuada*	NL
striped skunk	*Mephitis mephitis*	NL
southern flying squirrel	*Glaucomys Volans*	NL
white-footed mouse	*Peromyscus leucopus*	NL
white-tailed deer	*Odocoileus virginianus*	NL
woodchuck	*Marmota monax*	NL
woodland vole	*Microtus pinetorum*	NL
KEY: SSC = State Species of Special Concern; SGCN-HP = High Priority State Species of Greatest Conservation Need; NL = non-listed		

Eight species of bats could occur in the corridor for the SRWEC–NYS and Onshore Facilities (Table 4.6-4). Bat species can be divided into two major groups based on their wintering strategy: cave-hibernating bats and migratory tree bats. Cave-hibernating bats are year-round residents in the Northeast. Migratory tree bats occur during migration (spring and fall). Cave-dwelling bats disperse from summer roosting habitat to hibernacula in late summer and fall (BCI 2001; Maslo and Leu 2013). Both groups of bats are nocturnal insectivores that use a variety of forested and open habitats for foraging or roosting during the summer (BCI 2001).

Table 4.6-4. Bat Species on Long Island that Could Occur Within or Proximate to SRWEC–NYS and Onshore Facilities

Species/Type a/	Scientific Name; Species Code	Status
Cave-hibernating bats		
eastern small-footed bat	*Myotis leibii*; MYLE	SSC, SGCN
little brown bat	*Myotis lucifugus;* MYLU	SGCN-HP
NLEB	*Myotis septentrionalis;* MYSE	ST, SGCN-HP
tri-colored bat	*Perimyotis subflavus;* PESU	SGCN-HP
big brown bat	*Eptesicus fuscus;* EPFU	NL
Migratory tree bats		
eastern red bat	*Lasiurus borealis;* LABO	SGCN
hoary bat	*Lasiurus cinereus:* LACI	SGCN
silver-haired bat	*Lasionycteris noctivigans;* LANO	SGCN

Species/Type a/	Scientific Name; Species Code	Status
NOTES: a/ "Type" refers to wintering strategy: cave-hibernating bats disperse shorter distances to caves or mines to overwinter, while migratory tree bats migrate longer distances to milder climates where they roost in trees. KEY: FE = Federally Endangered; FT = Federally Threatened; FSR = Federal Status Review resulting from a petition for listing; SE = State Endangered; ST = State Threatened; SSC = State Species of Special Concern; SGCN = State Species of Greatest Conservation Need; SGCN-HP = High Priority State Species of Greatest Conservation Need; NL = non-listed		

The 2020 NYNHP database inquiry response letter did not indicate the occurrence of any known bat hibernacula in the vicinity of the Onshore Facilities (NYNHP typically screens projects for bat hibernacula within 40 miles) (NYNHP 2020). The NYS and federally threatened NLEB has the potential to occur in the corridor for the Onshore Facilities during summer (NYNHP 2020; USFWS 2020; K. Gaidasz, NYSDEC, email comm.; see *Rare, Threatened, and Endangered Inland Fisheries and Wildlife* below for additional details). No critical habitat has been designated for NLEB (USFWS 2020f). While present in New York, the NYS and federally endangered Indiana bat (*Myotis sodalis*) is not known to occur in Nassau or Suffolk counties (USFWS n.d.)

SRWEC–NYS

Both migratory tree bats and cave-hibernating bats may occur in the SRWEC–NYS corridor. Available information for both migratory tree bats and cave-hibernating bats suggests that activity is likely to increase with proximity to shore (Peterson et al. 2014; Stantec 2016).

Onshore Facilities

Terrestrial habitats associated with the Onshore Facilities may provide summer roosting, pup-rearing (*i.e.*, caring for young), and foraging habitat for bats, including species such as big brown bats, little brown bats, and tri-colored bats; these species will also roost in man-made structures such as attics or barns (BCI 2001). The pup-rearing season for these species of bats is typically May through July (Kunz 1982; Shump and Shump 1982a, 1982b) but may be longer in this region based on discussions with NYSDEC.

Reptiles and Amphibians

As documented in the *Long Island National Wildlife Refuge Complex Draft Comprehensive Conservation Plan and Environmental Assessment* (September 2006) issued by the USFWS, approximately 30 species of reptiles and amphibians were documented to occur within the Wertheim NWR which is located to the south of the Onshore Transmission Cable. Dominant freshwater reptiles include the eastern snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), spotted turtle (*Clemmys guttata*), and the northern watersnake (*Nerodia sipedon*). Dominant terrestrial reptiles include the Eastern box turtle (*Terrapene carolina carolina*), black racer (*Coluber constrictor*), eastern milk snake (*Lampropeltis triangulum*), and the common garter snake (*Thamnophis sirtalis*). Common amphibians include red-backed salamander (*Plethodon cinereus*), bullfrog (*Lithobates catesbeianus*), green frog (*Rana clamitans*), wood frog (*Lithobates sylvaticus*), Fowler's toad (*Anaxyrus fowleri*), and spring peeper (*Pseudacris crucifer*).

Terrestrial Rare, Threatened and Endangered Species

Rare, Threatened, and Endangered Plants

The USFWS, through a Project request, provided an official species list through its IPaC tool. IPaC provides the USFWS' record of federally listed rare, threatened or endangered (RTE) species in or near the vicinity of the Onshore Facilities, and includes six species. Critical Habitat is defined under the Endangered Species Act (ESA) as specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection (USFWS 2020a). No critical habitat for federally listed species is present within the SRWEC–NYS corridor and the Onshore Transmission Cable corridor. The list of NYS and/or federally listed plant species identified during agency review are presented in Revised Table 4.6-5.

Through a Project request, NYSDEC also reviewed the NYNHP database for records of NYS-listed animal and plants and significant NYS natural communities in or near the vicinity of the SRWEC–NYS near its terminus at Landfall HDD TJB in addition to Onshore Facilities. In its March 27, 2020 letter, the NYNHP identified several RTE plant species within 0.5 miles of the Onshore Transmission Cable as listed in Revised Table 4.6-5.

Revised Table 4.6-5. Plant Species Documented by NYSDEC or USFWS within the Vicinity of Onshore Facilities and Occurrence Based on Field Surveys

Species	Status	Habitat Association	Approximate Location	Potential at Onshore Facilities (Desktop)	Field Results c/
Sandplain Gerardia (*Agalinis acuta*)	FE, SE	Maritime grassland and shrubland	No location information provided a/	• Landfall Study Area • Onshore Transmission Cable	None observed; potential habitat at Landfall Study Area
Seabeach Amaranth (*Amaranthus pumilus*)	FT, ST	Maritime beach	No location information provided a/	• Landfall Study Area • Onshore Transmission Cable	None observed; potential habitat at Landfall Study Area
Blunt-lobe Grape Fern (*Botrychium oneidense*)	ST	Floodplain forest, Red Maple – Blackgum Swamp	Southaven County Park, within 0.25 mi (0.4 km) of Onshore Transmission Cable; in wet soil under	• Onshore Transmission Cable	None observed; Suitable habitat not likely present

Species	Status	Habitat Association	Approximate Location	Potential at Onshore Facilities (Desktop)	Field Results c/
			shrubs and vines in red maple swamp b/		
Collins' Sedge (*Carex collinsii*)	SE	Red Maple – Blackgum Swamp	Southaven County Park, within 0.25 mi (0.4 km) of Onshore Transmission Cable; abandoned fish hatchery (part of Suffolk County Park) in a red maple-tupelo swamp b/	• Onshore Transmission Cable	None observed; Suitable habitat not likely present
Water Pigmyweed (*Crassula aquatica*)	SE	Freshwater intertidal mudflat, freshwater intertidal shore, and freshwater tidal marsh	Onshore Transmission Cable: Carmans River, west side immediately south of Montauk Highway; bank of an intertidal section of river at a road embankment b/	• Onshore Transmission Cable	None observed; potential habitat in Carmans River
Sandplain Wild Flax (*Linum intercursum*)	ST	Maritime dunes, maritime grassland, maritime shrubland, and pitch pine-scrub oak barrens	Within 0.5 mi (0.8 km) of Onshore Transmission Cable: Station Avenue roadside; plants are on a pine barrens roadside with very sparse vegetation, dominated by grasses and legumes	• Onshore Transmission Cable	Potential habitat near Victory Avenue
NOTES: a/ Source: USFWS IPaC. Accessed March 2020 and March 2021 b/ Source: NYSDEC Natural Heritage Program Letter, March 27, 2020 c/ Field surveys for RTE plants evaluated the potential for suitable habitat within the Onshore Facilities and were not targeted surveys to determine potential presence / probable absence of species. KEY: FE = Federally Endangered; FT = Federally Threatened; FSR = Federal Status Review resulting from a petition for listing; SE = State Endangered; ST = State Threatened; SSC = State Species of Special Concern; SGCN = State Species of Greatest Conservation Need; SGCN-HP = High Priority State Species of Greatest Conservation Need; NL = non-listed					

Rare, Threatened, and Endangered Inland Fisheries and Wildlife

Terrestrial habitats associated with the Onshore Facilities may provide summer roosting, pup-rearing (*i.e.*, caring for young), and foraging habitat for the state and federally threatened NLEB. According to the most recent (2020) USFWS Summer Bat Survey Guidelines (Guidelines), suitable summer habitat for NLEB consists of a wide variety of forest types where they roost, forage, and travel, and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures (USFWS 2020e). There are several fragmented forested locations within the corridor for the Onshore Facilities that may provide summer habitat for bats, including the forested swamp areas along the Carmans River and forested areas along Victory Avenue and Horseblock Road and north of Union Avenue.

For NLEB bats, summer roosting habitat is typically occupied from mid-May through mid-August each year; the pup-rearing season (*i.e.*, when young are birthed and raised by females in maternity roosts) extends from early June through the end of July (USFWS 2020).

The NYNHP identified presence of the NLEB, specifically maternity roosts and other summer locations, at several locations within 0.5 mi (0.8 km) of the Onshore Transmission Cable and additional locations within 1.5 mi (2.4 km) (NYNHP 2020). According to the NYNHP, individuals may travel 1.5 mi (2.4 km) or more from documented roost locations (NYNHP 2020). The official species list generated from the IPaC database also indicated that NLEB has the potential to occur within the Onshore Facilities (USFWS 2020f). As a follow-up to an April 24, 2020 agency meeting, NYSDEC indicated that several areas along the Onshore Transmission Cable corridor have had acoustic detections for NLEB; in addition, roost trees have been documented within the Wertheim NWR, which is located to the south of the Onshore Transmission Cable (K. Gaidasz, NYSDEC, email comm.).

The NPS is coordinating an ongoing mist-netting and acoustic bat survey at the Fire Island National Seashore, including the unit at the William Floyd Estate on Long Island, which is within 2 mi (3.2 km) of the Onshore Transmission Cable corridor and 2.5 mi (4 km) of the Landfall Work Area. To date there have been seven species of bats detected on Fire Island and at the William Floyd Estate, including both cave-dwelling (big brown bat, eastern small-footed bat, NLEB, and tri-colored bat) and migratory bats (eastern red bat, hoary bat, and silver-haired bat) (NPS 2018, 2020). In 2015, 12 northern-long eared bats were captured at the William Floyd Estate, and in 2017, 2018, and 2019, NLEB were detected during acoustic surveys (NPS 2019, 2020). In 2018, northern-long eared bats were observed to be reproducing at the William Floyd Estate (NPS 2018). In 2015, NLEB were observed to be reproducing at Wertheim NWR (USFWS 2016), which is located to the south of the Onshore Transmission Cable.

The USFWS Official Species List identifies three species listed under the ESA as occurring in the "area of [the] proposed action" (see Appendix 4-E Addendum for the area reviewed by USFWS): piping plover (*Charadrius melodus*; federally threatened), red knot (*Calidris canutus rufa*; federally threatened), and roseate tern (*Sterna dougallii*; federally endangered). The Project is outside critical habitat for piping plover (USFWS 2020). No critical habitat has been designated for red knot or roseate tern. The USFWS IPaC database query did not indicate occurrences of federally listed fish or non-avian or bat wildlife species in the "area of [the] proposed action".

The location where the SRWEC-NYS will make landfall consists of beach habitat where piping plover have historically nested. Smith Point County Park had 25 breeding pairs of piping plover in 2018 (Jennings 2018). During an April 24, 2020 teleconference with NYSDEC and USFWS, NYSDEC noted that piping plovers do not typically nest in front of beach access points. Red knots are known to be present only during spring and fall migratory periods, along salt meadows and mudflats of the South Shore of Long Island. Roseate terns generally migrate through the region during spring and fall, and have historically nested at Fire Island National Seashore, and on small islands off of Long Island as well. Results of the 2018 Long Island colonial waterbird surveys found over 2,000 roseate tern breeding pairs on Great Gull Island, approximately 48 mi (42 nm; 77 km) east-northeast of Smith Point County Park (Jennings 2018). Surveys on coastal Long Island also reported active breeding sites for least tern (*Sternula antillarum*, NYS threatened), common tern, Forster's tern (*Sterna forsteri*), black skimmer (*Rynchops niger*, NYS Special Concern), and gull-billed tern (*Gelochelidon nilotica*, NYS species of Greatest Conservation Need) (Jennings 2018).

During the April 24, 2020 teleconference, NYSDEC indicated that terns have historically nested on dredged material adjacent to the Smith Point Marina parking lot. The NYNHP inquiry response also indicated that piping plover, least tern, and common tern have been documented in the vicinity of the Onshore Facilities (NYNHP 2020). Each of these species may utilize resources at or adjacent to the Onshore Facilities, by means of foraging, nesting, or migrating through the area.

Bald eagles (*Haliaeetus leucocephalus*) are protected under the Bald and Golden Eagle Protection Act of 1940 (as amended in 1962; BGEPA) and have a year-round presence in the region (NYSDEC 2015b). The bald eagle is a large raptor that is broadly distributed and generally found nesting in association with water (lakes, rivers, bays) in both freshwater and marine habitats (Buehler 2000). The wing morphology of bald eagles and their reliance on thermal updrafts, generally dissuades long-distance movements in offshore settings (Kerlinger 1985). Bald eagles are present year-round in the region and have been slowly increasing in numbers over the last 30 years. Bald eagles have recently returned to Long Island (NYNHP 2020), and are known to breed throughout NYS, with the exception of the New York City area, and a portion of central NYS (NYSDEC 2015b).

In its March 27, 2020 letter, the NYNHP identified an occurrence of hairy-necked tiger beetle (*Cincindela hirticollis*), a rare but unlisted species, near the Landfall/ICW Study Area on Fire Island. The species is associated with a sand beach. A review of aerial imagery indicates that the ICW HDD Work Area also contains exposed sandy areas and suitable habitat for hairy-necked tiger beetle. Field surveys also identified that the Maritime Dune community near the Landfall/ICW Study Area provides potentially suitable habitat for this species. In addition, the NYNHP identified two unlisted but rare fish occurrences within the Carmans River near the Onshore Transmission Cable: eastern pirate perch (*Aphredoderus sayanus*) and Atlantic silverside (*Menidia menidia*).

No RTE species were observed within the surveyed portions of the Onshore Facilities during field visits in June and October 2020. While the Onshore Interconnection Route was not visited, the presence of RTE species here is unlikely given the industrial and commercial nature of these areas.

Invasive Species

Over 100 non-native invasive plant species occurrences have been documented within or adjacent to the corridor for the Onshore Facilities based on a query of the NY iMapInvasives database. The invasive plant species documented include:

- Norway maple (*Acer platanoides*)
- Tree-of-heaven (*Ailanthus altissma*)
- Japanese barberry (*Berberis thunbergii*)
- Oriental bittersweet (*Celastrus orbiculatus*)
- Black swallow-wort (*Cynanchum louiseae*)
- European privet (*Ligustrum vulgare*)
- Japanese honeysuckle (*Lonicera japonica*)
- Purple loosestrife (*Lythrum salicaria*)
- Chinese silvergrass (*Miscanthus sinensis*)
- Princess tree (*Paulownia tomentosa*)
- Mile-a-minute weed (*Persicaria perfoliata*)
- Common reed (*Phragmites australis*)
- Japanese knotweed (*Fallopia japonica*)
- Black locust (*Robinia pseudoacacia*)
- Multiflora rose (*Rosa multiflora*)
- Wineberry (*Rubus phoenicolasius*)
- Climbing nightshade (*Solanum dulcamara*)
- Great mullein (*Verbascum thapsus*)
- Common periwinkle (*Vinca minor*)

Most of the occurrences are associated with the Wertheim NWR which is located to the south of the Onshore Transmission Cable. Additional locations of invasive plants have been documented proximal to the HDD work areas. In addition, the March *2019 Final Design Report/Environmental Assessment for the replacement of the William Floyd Parkway, Route CR 46 over Narrow Bay* (NYSDOT 2019) notes a prevalence of invasive species such as Japanese honeysuckle, common reed, autumn olive (*Elaeagnus umbellata*), oriental bittersweet, and multiflora rose near Smith Point Bridge. Widespread occurrences of invasive plant species are likely throughout corridor for the Onshore Facilities given the Project's association with developed residential and industrial areas and proliferation of invasive species throughout the greater Long Island region.

Land adjacent to the Landfall/ICW Study Area on the Mainland, the Onshore Transmission Cable, the Union Avenue Site, and the Onshore Interconnection Cable largely consist of developed residential, commercial, utility or industrial land uses. Based both on proximity of the Onshore Facilities to areas that have been previously disturbed and on a query of the NY iMapInvasives iMAP3.0 exotic, terrestrial and wetland invasive plant species have been previously documented along the corridor for the Onshore Transmission Cable and the Union Avenue Site. Documented invasive plant species from the IMapInvasives iMAP3.0 query include Tree-of-heaven (*Ailanthus altissma*), Japanese barberry (*Berberis thunbergii*), European privet (*Ligustrum vulgare*), Purple loosestrife (*Lythrum salicaria*), Mile-a-minute weed (*Persicaria perfoliata*), Japanese knotweed (*Fallopia japonica*), and rambler rose (*Rosa multiflora*). Based on the field surveys, invasive species are ubiquitous throughout the Onshore Facilities and results were consistent with species and locations identified in the NY iMapInvasives query. Mugwort (*Artemisia vulgaris*) was the most prevalent species observed and commonly occurs along road shoulders throughout the Onshore Facilities. Large concentrations of common reed were observed along the backside of Fire Island and at Smith Point Marina at the Landfall Study Area. Additional commonly observed invasive species across the Onshore Facilities included Norway maple, rambler rose (*Rosa multiflora)*, oriental bittersweet, autumn olive, Japanese honeysuckle, black locust, garlic mustard (*Alliaria petiolata*), Japanese barberry, and common reed (*Phragmites australis*).

4.6.2 Potential Terrestrial Ecology and Wildlife Impacts and Proposed Mitigation

This section examines the potential impacts to the terrestrial ecology and wildlife anticipated as a result of the construction and operation of the Project, and identifies measures to avoid or mitigate these impacts. Construction and operational activities associated with the Project have the potential to cause both direct and indirect impacts to terrestrial ecology and wildlife.

Potential Construction Impacts and Proposed Mitigation

SRWEC–NYS

Direct impacts from construction activities related to the installation of the SRWEC–NYS to terrestrial ecology and wildlife, to the extent they may occur at all and cannot be avoided and/or mitigated, will be limited to marine and coastal marine birds. The work spaces at the Landfall/ICW Work Area at Smith Point County Park and Smith Point Marina will primarily be located within paved areas of the parking lots or open land used for recreational activities but stringing activities may occur on the beach. The use of HDD for installation will minimize impacts to onshore habitats and protect wildlife in those habitats. Suitable summer roosting habitat for bats is not present within beach and intertidal habitats due to the lack of roost trees.

The interconnection of the SRWEC–NYS to the Landfall Work Area will cause disturbances to the benthic and intertidal areas that could potentially indirectly impact birds that forage in the nearshore area by temporarily displacing and/or obscuring their prey base (*e.g.*, invertebrates foraged on by shore birds and ducks) by reducing visibility and inhibiting prey-detection. Potential effects on prey species are expected to be temporary in nature (*i.e.*, limited to a small area around work activities), and birds will likely only need to fly a short distance to find alternative prey sources in similar adjacent habitats. BMPs will be in place to minimize the opportunity for turbid discharges leaving construction work areas. Impacts to the seafloor and resulting sediment deposition from SRWEC–NYS installation activities will be temporary and impacts resulting in potential changes to prey base composition and inhibited prey detection will be short-term and minimal due to the availability of other foraging habitats outside of localized construction areas.

Above and below water noise generated by cable installation activities at the SRWEC–NYS could lead to indirect effects including temporary displacement of coastal marine birds from construction areas. Since construction noise will be temporary it is not likely to cause long-term displacement effects to coastal marine birds.

Where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts; activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Accidental disposal of trash into the water does represent a risk to birds as they could potentially ingest or become entangled in debris. Ingestion of macroplastics and microplastics can affect birds by interfering with flight and foraging as well as reduced fitness and/or survival, due to the plastics acting as a vector for other contaminants (Roman et al. 2019; Tanaka et al. 2013; Teuten et al. 2009; Yamashita et al. 2011). However, with proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Vessel traffic associated with construction of the SRWEC–NYS could temporarily attract some birds and bats and cause others to avoid the area, or in rare cases, the direct effect of colliding with the vessels at night. However, these impacts will be short-term and similar to normal, non-Project-related vessel traffic and are not likely to cause any permanent loss of habitat or significant collision mortality.

During construction of the SRWEC–NYS, the presence of construction equipment and vessels could present collision hazards, particularly at night and during periods of poor visibility. However, construction activities will be short-term and will be generally confined to good weather. There may be some activities that will occur at night during which these structures may be lit for navigation and safety purposes. Artificial lighting sources may attract birds, increasing collision risk during poor weather (Fox et al. 2006). Brightly illuminated structures offshore, such as research platforms, pose a risk to birds migrating at night, particularly during rain or fog when birds can become disoriented by sources of artificial light (Hüppop et al. 2006). Since construction activities will be short-term and will be generally confined to good weather, potential impacts are considered minimal. Furthermore, lighting during construction activities will be limited to the minimum required for safety during construction activities to minimize impacts.

Onshore Facilities

Potential direct impacts to terrestrial ecology and wildlife during construction of the Onshore Facilities will be avoided and minimized to the maximum practicable extent by locating Project infrastructure primarily in previously disturbed or developed areas. Direct impacts to terrestrial habitats may be associated with land disturbance during construction activities. Where direct impacts cannot be avoided, it is expected that most of the impacts will be temporary, as the impacted area will be restored to pre-construction conditions.

The Onshore Facilities are largely confined to existing developed and impervious areas including road ROWs and parking lots where RTE plants are unlikely to occur. Furthermore, the Project will utilize trenchless crossing installation to avoid impacts to wetland areas that may provide habitat for wetland-associated RTE plant species such as blunt-lobe grape-fern (*Botrychium oneidense*), Collins' sedge (*Carex collinsii*), and water pigmyweed (*Crassula aquatica*). However, suitable habitat for several RTE species, such as sandplain wild flax (*Linum intercursum*), may be present where Project components intersect non-impervious (*i.e.*, undeveloped) areas such as roadside or parking lot edges.

At the Landfall Work Area, vegetation clearing and grading will be minimal as workspace will be largely limited to the developed areas (*i.e.*, parking lot and surface roads). Use of HDD construction methods for transitioning the SRWEC to the Onshore Facilities will further avoid and minimize potential impacts to sensitive resources, such as Maritime Beach, a NYNHP Rare and Significant Natural Community. If assembled on the beach, HDD conduit stringing activities would be located within the Smith Point County Park SCFWH. HDD conduit stringing would require laydown of linked conduit sections within terrestrial habitats prior to installation via HDD. HDD conduit stringing is anticipated to occur for 2-3 weeks per duct in fall and winter. Landfall Work Area activities largely will be confined to existing developed areas to avoid and minimize potential impacts to sandplain gerardia, seabeach amaranth, and sandplain wild flax. HDD conduit stringing, however, will require temporary short-term (2-3 weeks) disturbance to beach communities where these species may occur. These species were not observed during field surveys of the Onshore Facilities.

HDD stringing work is not likely to result in adverse impacts to Maritime Beach. Where the HDD stringing is proposed, the beach area is unvegetated and is well-used by pedestrians. Additionally, portions of this area are open to vehicular traffic. Construction equipment will utilize existing access roads onto the beach. No portions of vegetated sand dunes will be affected by the HDD stringing activities. The Applicant will observe appropriate time of year restrictions for construction activities to the extent feasible. If work is anticipated to occur outside of time-of-year restriction periods, the Applicant will work with state and federal agencies to develop appropriate construction monitoring and impact minimization plans included as part of the Project EM&CP.

Along the Onshore Transmission Cable, terrestrial land cover types mainly consists of developed residential or industrial land uses, with the exception of forested wetlands and waterways at the Carmans River. The Onshore Interconnection Cable is also located generally within the paved portion of existing roadways and utility-owned or controlled property. The Onshore Transmission Route will intersect the Carmans River. With the exception of these locations, the Onshore Facilities will largely be sited within previously disturbed and developed areas to the extent practicable to minimize impacts to natural locations. Where open trenching methods are used, construction activities will be limited to roadway and utility ROWs using appropriate erosion control measures. However, in the unlikely event that these measures do not work effectively, sediment suspension and deposition could occur within adjacent waterbodies or wetlands. These impacts would be temporary and properly mitigated, with water quality returning to pre-existing conditions quickly after the end of construction. The use of trenchless crossings, such as HDD, for installation of portions of the Onshore Transmission Cable/Interconnection Cable (such as in the vicinity of the Carmans River), will minimize impacts to terrestrial habitats. Finally, the implementation of applicable permits and environmental protection measures (including the Project's SWPPP) during earth disturbance will further minimize impacts from disturbed sediments for Onshore Facilities.

Construction of the OnCS-DC and in minimal areas along the Onshore Transmission Cable and Onshore Interconnection Cable will result in initial land disturbance and tree clearing. The Union Avenue Site is primarily a developed industrial/commercial site with small narrow forested areas along parcel boundaries, and very limited vegetation clearing would be required at this location. Construction of the OnCS-DC, Onshore Transmission Cable, and Onshore Interconnection Cable is expected to result in approximately 2.3 acres (0.9 ha) of permanent tree clearing. The Applicant will use mechanical clearing methods for the construction of the Project and does not intend to use any herbicides/pesticides during construction and installation.

There may be minimal localized direct changes in habitat affecting roosting and foraging opportunities as a result of land disturbance during construction of the Onshore Facilities. Following work activities, disturbed areas will emerge as early successional habitat, with access locations initially revegetating as a grass/forb and herbaceous cover, then gradually transitioning to shrub and sapling cover. Habitat loss will be minimal in the Town of Brookhaven area because, in addition to forested areas, the baseline habitat conditions of this general area include developed residential areas, mowed lawns, parking lots, roads, and commercial and industrial areas. The early successional habitat that will replace the cleared areas and temporary workspace locations outside of the operational footprint of infrastructure may not provide the same benefit to bats in terms of roosting and pupping habitat. However, this habitat may provide new foraging opportunities since many species prefer traveling and foraging along edge habitats, such as tree lines, hedgerows, forest edges, and linear water features (Nelson and Gillam 2017; Verboom 1998).

Vegetation/tree clearing during construction has the potential to cause mortality or injury to bat and bird individuals that are less mobile (*e.g.*, pups and chicks, respectively). Impacts resulting in mortality and injury from construction activities will be minimized as the Project will conduct activities consistent with the federal ESA 4(d) Rule for NLEB, which prohibits incidental take from tree removal activities within 150 ft (45.7 m) of a known occupied maternity roost tree during the pup-rearing season (June 1 to July 31). To the extent feasible, tree removal for the Onshore Facilities will occur between December 1 and February 28; this timeframe was identified by the NYSDEC specifically for the Project to avoid the NLEB active period (K. Gaidasz, NYSDEC, email comm.) Per NYS's *Protective Measures Required for Northern Long-eared Bats When Projects Occur within Occupied Habitat* (Requirements for Projects that Result in a Change of Land Use Within Occupied Habitat; NYSDEC n.d.[d]), no cutting of any trees can occur within a 0.25-mile (0.4-km) buffer around a hibernation site (year-round), no cutting of documented roost trees can occur, and no cutting of any trees within a 150-foot (45.7-m) radius of a documented summer occurrence can occur. If tree removal activities cannot be limited in this manner, the Applicant will consult with NYS regarding mitigation, if necessary. Time of year restrictions for tree removal to avoid impacts to NLEB would also benefit breeding birds. As such, direct mortality or injury impacts to bat species as a result of clearing activities and land disturbances during construction are not expected.

Noise resulting from construction activities for the Onshore Facilities may temporarily disturb bats and displace land birds. Most construction activity for the Onshore Facilities will take place during the day, when bats are in an energy conserving state of torpor (Geiser 2004; Speakman and Thomas 2003). Where conducted, trenchless installation operations along the Onshore Transmission Cable and Onshore Interconnection Cable will occur continuously to minimize the risk of soil settlement and equipment failures and, therefore, will create noise during nighttime hours as well. To determine bat response to anthropogenic sound, a study evaluated the effect of noise on torpid bats by subjecting them to a series of natural and anthropogenic playback sound files while the bats were in torpor; results showed that bats responded most strongly (awoke from torpor) to colony and vegetation noise and most weakly to traffic noise (Luo et al. 2014). The study also indicated that bats can quickly habituate to continuous or repeating noise disturbances (Luo et al. 2014). Another study investigating impacts of anthropogenic noise on bat foraging behavior found that bats avoided areas subjected to loud noises, suggesting foraging areas close to highways and other sources of loud noise are less suitable for foraging bats (Schaub et al. 2008). While there is no study available that describes HDD noise effects on bats, noise from HDD is expected to be similar to highway noise impacts. Noise from HDD and construction traffic noise may disrupt or displace roosting and/or foraging bats if conducted during the bat active season. However, noise impacts will be temporary and localized.

Noise generated by construction also has the potential to flush land birds and may also ‘mask’ bird calls, potentially reducing the ability of birds to forage, communicate, or detect predators (Bottalico et al. 2015; Ortega 2012). These temporary effects could potentially lead to decreased breeding success. However, infrastructure associated with the Onshore Facilities will generally be sited within and adjacent to previously disturbed and developed areas, and noise disturbances will be limited to construction periods and localized areas with construction activity.

Traffic resulting from construction activities for the Onshore Facilities may result in direct impacts to birds and bats in the form of mortality or injury in the rare event that a bird or bat may collide with a moving construction vehicle. Construction equipment also has the potential to impact ground nests of birds. The approach of moving vehicles may also temporarily displace birds and bats if present in construction areas. Most construction traffic for the Onshore Facilities will occur during the day while bats are in torpor, outside of the active foraging period between twilight and sunrise. HDD may occur at night during active foraging periods, but this activity is not expected to significantly disrupt bats because the HDD equipment will be stationary and continuous. Traffic may also result in indirect effects such as displacement of land birds from construction areas, or disruption of normal behaviors within the vicinity of construction activities. However, the majority of the Onshore Transmission Cable occurs within unsuitable habitat for many land bird species. Therefore, risk of impacts to birds due to direct and indirect impacts from traffic is expected to be low. Traffic during construction activities is not expected to pose a significant source of mortality or disturbance, and associated impacts are considered short-term and localized.

Visible infrastructure present during the Onshore Facilities construction activities will include construction equipment and the OnCS–DC. Birds are expected to avoid collisions with stationary structures during periods of good visibility but may be at risk of collision at night (particularly when disoriented by lighting. There is little evidence regarding collision risk of bats with the onshore components of wind farms such as the OnCS–DC, though there are documented bat fatalities in other onshore electric utilities, such as above-ground transmission and powerline corridors (Manville 2016). However, these types of man-made structures are already present throughout the developed and residential areas on Long Island, and transmission facilities will be installed underground. Bats use echolocation to navigate by emitting high-frequency sounds and listening for echoes to determine the location of objects (Potenza 2017; Schnitzler et al. 2003). Therefore, bats can avoid obstacles and locate prey and water sources. However, some smooth, vertical surfaces such as glass and metal reflect the bats' high frequency sounds away from the bat, not toward it (Potenza 2017), which may lead to collision, resulting in injury or mortality. Construction activities will be short-term and risk of mortality or injury as a result of the presence of Project infrastructure is considered low.

Temporary lighting during certain phases of construction of the Onshore Facilities may be required. While most of the onshore construction will occur during the daylight hours, some overnight lighting may occasionally be necessary, including lighting for HDD work. Nighttime lighting on construction equipment during specialized construction activities (*e.g.*, HDD) may attract birds, particularly during periods of low visibility (*e.g.*, rain and fog), and indirectly result in collision mortality or injury. Potential indirect impacts to bats resulting from lighting during some construction activities at the Onshore Facilities may include temporary displacement or attraction of individuals (if insect prey concentrate around light sources), or disruption of normal behavior (*e.g.*, foraging, breeding). In some cases, bright illumination of areas can potentially prevent or reduce foraging activity, causing bats to pass quickly through the lit area or avoid it completely (Polak et al. 2011). Additionally, certain types of lighting can disrupt the composition and abundance of insect prey (Davies et al. 2012), which may in turn reduce foraging opportunities for bats. Because most construction activities will occur during the day, impacts associated with lighting are considered short-term and minimal.

Potential spread of invasive plant species as a result of land disturbance from construction of Onshore Facilities will be managed through implementation of an Invasive Species Management Plan (ISMP) that will be developed as part of the Project EM&CP. Land disturbance may indirectly result in the spread of invasive species and the loss of native habitat for birds and bats or displacement of individuals. A study that evaluated ways to improve foraging opportunities for bats found that *Myotis* sp. activity was greater near waterways that included native plants and were clear of invasive species (Lintott et al. 2015). Invasive plants can clutter the understory of a forest, suppress native tree regeneration, and physically reduce the amount of unobstructed subcanopy space where many bats prefer to forage (King 2019). However, the spread of invasive plant species will be managed in compliance with state and federal regulations and the Project's ISMP. A Preliminary ISMP (PISMP) is provided as Revised Appendix 4-F - Preliminary Invasive Species Management Plan.

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods, installation of the Onshore Transmission Cable or Onshore Interconnection Cable, or during construction activities at the OnCS-DC. A Spill Prevention, Control and Countermeasures (SPCC) Plan will be developed and any discharges or release will be governed by NYS regulations. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts, as activities are heavily regulated and discharges and releases are considered accidental events that are unlikely to occur.

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. All trash and debris will be properly disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any solid waste or debris in the water will be prohibited. With proper waste management procedures, the potential for trash or debris to be inadvertently introduced into the onshore area is unlikely.

Potential Operation Impacts and Proposed Mitigation

During operation of the Project, infrastructure associated with the SRWEC–NYS, Onshore Transmission Cable and Onshore Interconnection Cable will be located underground and will have no impact on terrestrial habitats or wildlife. Non-routine maintenance may cause limited land disturbance for temporary access to assess damage and for repair or replacement of infrastructure, but such occurrences are expected to be infrequent, localized, and short-term and largely limited to developed roadway ROWs. Further, as these activities will largely occur within areas previously disturbed for initial construction, operational impacts to terrestrial habitat will be minimal. The Onshore Transmission Cable and Onshore Interconnection Cable will be underground, thereby eliminating collision risk of avian and bat species with overhead lines.

While the vegetation management requirements for the Project are expected to be minimal, the use of herbicides to effectively manage the vegetation for reliability purposes would be considered as a part of an effective Integrated Vegetation Management (IVM) program. IVM practices include manual cutting, mowing and the prescriptive use of federally approved and state registered herbicides to eliminate targeted plant species within the ROW. Herbicides are an integral part of the IVM program and would be applied, using federally approved, NYS listed herbicides, following all NYS and local regulations and label restrictions. More specific details on the IVM program would be provided within the Project EM&CP.

Operational activities at the Union Avenue Site are not expected to impact coastal and terrestrial habitat for avian species and bats.

During operations, the OnCS–DC will introduce new sources of sound, including transformers, shunt reactors, harmonic filters, cooling, and ventilation associated with the outdoor substation equipment, as well as condensers, pumps, skids, and auxiliary transformers associated with the synchronous condenser building. Temporary noise may occasionally be generated due to routine and non-routine maintenance during operations. Anthropogenic sources of noise have been shown to have negative impacts on fitness and breeding success of land birds (Kleist et al. 2018). However, the OnCS–DC will be sited in an already developed area, and sources of noise during operations are expected to be comparable to general commercial and industrial activities already occurring in the area. In such cases, short-term avoidance behavior and/or displacement of avian species may occur due to disruptions caused by noise, but these would be expected to be short-term and minimal. As discussed in the Onshore Facilities construction section above, bat responses to anthropogenic sound suggest that traffic noise is less disturbing to torpid bats than colony or vegetation noise (Luo et al. 2014); therefore, bats may quickly habituate to prolonged noise disturbances. Noise could potentially cause temporary avoidance behavior and/or displacement of bat species; however, most noise impacts would be short-term. Some sources of noise at the OnCS-DC will be long-term and repeated/continuous, but risk of impacts associated with such noise is considered minimal.

Traffic will occasionally occur in association with routine and non-routine maintenance at the Onshore Facilities. Impacts associated with moving maintenance vehicles may include temporary displacement of avian and bat species from sites undergoing maintenance activities. In very rare cases, birds may be at risk of collision with moving vehicles and traffic may also result in mortality/injury in the rare event that a bat were to collide with a moving maintenance vehicle. However, because most maintenance activities are anticipated to occur during daylight periods when bats are inactive, the short-term risk of impacts due to traffic is considered minimal.

As indicated in the construction section above, the OnCS-DC will be visible above-ground infrastructure. This change in the landscape presents a low likelihood of mortality or injury due to the ability of birds and bats to generally detect and avoid collision with non-reflective stationary structures. This risk of collision mortality or injury is considered long-term but minimal. Birds outside of migration are mainly diurnal and will be able to visually detect the OnCS-DC structures during the day. Bats may be attracted to the OnCS-DC for roosting opportunities as some species, including big brown bats, often take advantage of man-made structures. It is expected that access to the interior of the OnCS-DC will be prevented, potentially by the use of screens or similar measures. Therefore, the risk of impacts associated with bats being attracted to the OnCS-DC for roosting opportunities will be long-term but minimal.

During operation of the OnCS-DC, general yard lighting will be used within the OnCS-DC for assessment of equipment. Nighttime lighting, particularly during periods of inclement weather during migration, could serve as an attractant to disoriented birds and increase their risk of collision with structures at the OnCS-DC. Lighting at night also has the potential to temporarily displace or indirectly attract bats if insect prey concentrates near lighting—either behavioral response represents a disruption of normal behavior. However, nighttime lighting will be limited to periods when operational activities occur and is expected to be infrequent. Lighting at the OnCS-DC will be limited to the minimal level required for safety purposes. Since the use of lighting at night is expected to be limited, impacts associated with collision risk due to lighting at the OnCS-DC are expected to be minimal, and the potential for temporary bat displacement and/or other behavioral changes is considered a long-term effect having minimal impact.

The OnCS-DC will require various oils, fuels, and lubricants to support its operation and sulfur hexafluoride (SF_6) gas will also be used for electrical insulating purposes. Equipment will be mounted on concrete foundations with concrete secondary fluid containment designed for 110 percent containment volume and in accordance with industry and local utility standards. As described above in the construction section, although no impacts from discharges and releases are anticipated, accidental discharges, releases, and disposal could occur. However, risks will be avoided through implementation of the measures described in the SPCC. Further, with the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on terrestrial ecology and wildlife. These measures are based on protocols and procedures successfully implemented for similar projects.

- The SRWEC–NYS will be installed via HDD to avoid impacts to habitats and wildlife. The Onshore Transmission Cable will be installed via HDD under the ICW to avoid impacts to coastal resources and HDD and trenchless methods will also be used elsewhere onshore, where appropriate, to minimize impacts to the terrestrial ecology and wildlife.
- Where HDD is utilized, an Inadvertent Return Plan will be prepared and implemented to minimize the potential risks associated with the release of drilling fluids.
- Onshore Facilities are primarily sited within previously disturbed and developed areas (*e.g.*, roadways, ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts to terrestrial ecology and wildlife.
- Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Limiting lighting to that which is required for safety and compliance with applicable regulations is expected to minimize impacts on avian species.
- Time of year restrictions for certain work activities (*e.g.*, HDD conduit stringing and tree removal) will be employed to the extent feasible to avoid or minimize direct impacts to terrestrial habitat and RTE species during construction of the SRWEC–NYS Landfall and Onshore Facilities. If work is anticipated to occur outside of these time-of-year restriction periods, the Applicant will work with NYS and federal agencies, to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.
- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to birds and bats associated with overhead lines. A SPCC Plan will be developed and any discharges or release will be governed by NYS regulations.

- An ISMP will be implemented to manage the spread of invasive plant species that could negatively affect native plants and coastal habitat.

4.7 WETLANDS AND WATER RESOURCES

This section provides a description of the wetlands and waterbody resources identified within or proximate to the Project and an assessment of potential impacts to such resources resulting from construction and operation of the Project.

The description of the existing conditions and assessment of potential impacts were developed by reviewing publicly-available online data portals and GIS mapping databases (*e.g.*, National Hydrography Dataset [NHD], USFWS National Wetlands Inventory [NWI], NYSDEC-Regulated Freshwater Wetlands and Tidal Wetlands), and through communications with federal, NYS and local agencies.

To support Project planning and design, a desktop assessment of the Onshore Facilities was conducted to identify the potential presence of regulated natural resources, such as wetland and waterbody resources (Appendix 4-E and and Appendix 4-E Addendum).

Floodplains are addressed in Section 4.2, Land Use. Information regarding terrestrial habitats and ecology is addressed in Section 4.6, Terrestrial Ecology and Wildlife. Subtidal habitats, such as SAV, which may occur in the vicinity of the Project, are addressed in Section 4.8, Benthic and Shellfish Resources.

4.7.1 Existing Wetlands and Waterbody Resources

The SRWEC–NYS will be predominately located in NYS waters but will terminate within the Landfall Work Area on Fire Island. In this section, the term Landfall/ICW Study Area is used to describe an area encompassing the Landfall Work Area (in Smith Point County Park on Fire Island), the adjacent HDD conduit stringing area, the ICW Work Area (in Smith Point County Park and in Smith Point Marina on the mainland), as well as the adjacent lands around these areas to allow for the possibility of future design adjustments (see Revised Figure 4.7-1). The term “Landfall/ICW Study Area on Fire Island” is used to specifically describe the assessed areas on Fire Island, while the term “Landfall/ICW Study Area on the Mainland” is used to specifically describe the assessed areas within Smith Point Marina. The Landfall/ICW Study Area on Fire Island, where the Landfall Work Area will provide the transition between SRWEC–NYC and Onshore Facilities, occupies a paved parking lot at Smith Point County Park, portions of beach along the Atlantic Ocean to the south of William Floyd Parkway, and the vegetated backshore areas along the bay. From the Landfall Work Area, the cable corridor will transit through developed areas to the ICW Work Area on Fire Island, under the ICW via HDD to the ICW Work Area on the Mainland. For the purposes of the below analysis, discussion of Great South Bay was also included where applicable, as habitats within Great South Bay are representative of the hydrologically connected and immediately adjacent ICW.

The Onshore Facilities are generally located within existing ROWs and/or industrial areas. The Onshore Transmission Cable will generally be routed within the paved portion of existing road ROWs, and will cross the Carmans River via HDD. The Onshore Interconnection Cable will also be located generally within the paved portion of the existing roadway ROW and utility-owned or controlled property.

Tidal Wetlands

Tidal wetlands under Article 25 of the NYECL are those areas which border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters. In addition, per 6 NYCRR Part 661.4, adjacent areas up to 300 ft (91.4 m) inland from the tidal wetland boundary are regulated to provide further protection.

The ICW HDD will cross under several mapped NYSDEC-designated tidal wetland categories in the Great South Bay-East SCFWH, including Littoral Zone (LZ) and Coastal Shoals, Bars, and Mudflats (SM) before reaching the ICW HDD Work Area at Smith Point Marina (Revised Figure 4.7-3, Table 4.7-1 and Appendix 4-E and and Appendix 4-E Addendum). These tidal wetlands are also mapped by the NWI as estuarine wetlands (E1AB3L, E1UBL, and E2U5N) (Revised Figure 4.7-2).

The Landfall/ICW Study Area on Fire Island will be located within the 300 ft (91.4 m) adjacent area of tidal wetlands as mapped by the NYSDEC including LZ and SM wetland categories within the ICW. The Landfall/ICW Study Area on the Mainland will be located within the 300 ft (91.4 m) adjacent area of mapped LZ, IM, and High Marsh (HM) tidal wetlands to the west. The ICW HDD will be located underneath tidal wetlands as mapped by the NYSDEC including LZ and SM wetland categories.

Freshwater Wetlands

Freshwater wetlands in NYS, under Article 24 of the NYECL, must be at least 12.4 acres in size or provide local importance if smaller in area. An adjacent area of 100 ft (30.4 m) around a mapped NYSDEC freshwater wetland is regulated to provide further protection. The NYSDEC ranks regulated freshwater wetlands according to a hierarchy of four wetland classes defined in 6 NYCRR Part 664.5 (Classes I through IV). The hierarchy is based upon the degree of benefits that the wetland provides. Wetland benefits are dependent upon many factors, including vegetative cover, ecological associations, special features, hydrological and pollution control features, distribution, and location.

The Onshore Transmission Cable will traverse mapped NYSDEC-regulated freshwater wetlands at two locations which border the Carmans River (Revised Figure 4.7-3, Revised Table 4.7-1 and Appendix 4-E and and Appendix 4-E Addendum). At these crossings, wetlands are also mapped by the NWI as forested and freshwater pond at Carmans River (PFO1E and PUBHh) and are both designated as Class 1 wetlands by NYSDEC. Pursuant to 6 NYCRR Part 663.5(e), Class I wetlands provide the most critical of the NYS's wetland benefits, reduction of which is acceptable only in the most unusual circumstances (see Appendix 4-E Addendum).

One NWI-mapped seasonally flooded, palustrine emergent persistent wetland (PEM1A) is located parallel to I-495, approximately 150 ft (46 m) south of the Onshore Interconnection Cable (Revised Figure 4.7-2). This wetland is not mapped as a NYSDEC-regulated wetland.

Based on a review of available spatial data, there are no mapped NYSDEC-regulated freshwater wetlands or NWI wetlands along other areas of the Landfall/ICW Study Area or Onshore Transmission Cable, at the Union Avenue Site, or along the Onshore Interconnection Cable.

Waterbodies

Under Article 15 of the NYECL, certain waters of NYS are protected on the basis of their classification. Streams and small water bodies located in the course of a stream that are designated as Classification C, supporting a trout population (C(T)) or higher (*i.e.*, Classification C, Trout Spawning [C(TS)], Classification B, or Classification A) are collectively referred to as "protected streams". Additionally, small ponds and lakes with a surface area of ten acres or less, located within the course of a stream, are considered to be part of a stream and are also subject to regulation under the stream protection category of Protection of Waters.

Wild, Scenic, and Recreational River are regulated under Article 15, Title 27 of the NYECL. NYS's Wild Scenic and Recreational Rivers Act protects those rivers of NYS that possess outstanding scenic, ecological, recreational, historic, and scientific values. These attributes may include value derived from fish and wildlife and botanical resources, aesthetic quality, archaeological significance and other cultural and historic features. The Wild Scenic and Recreational Rivers Act focuses on preserving designated rivers in a free flowing condition, protecting them from improvident development and use.

One coastal waterbody, the Great South Bay/ICW, is intersected by the ICW HDD as it transits between the ICW Work Area on Fire Island and the ICW Work Area on the Mainland (Revised Figure 4.7-3). Additional information related to water quality of the Great South Bay/ICW is provided in Section 4.11, Marine Physical and Chemical Characteristics.

In addition, the Onshore Transmission Cable will traverse waterbodies at one location: Carmans River (Revised Figure 4.7-3, Revised Table 4.7-1 and Appendix 4-E and Appendix 4-E Addendum). Additional information related to water quality of the Carmans River is provided in Section 4.11, Marine Physical and

Chemical Characteristics. The NYSDEC classifies Carmans River as C(TS); as such, it is protected under Article 15.

The Onshore Transmission Cable will cross Carmans River at a section that is designated by the NYSDEC as a Recreational River, which includes all portions of the river that are approximately one mile southerly from the Concrete Wing Dam in Southaven Park, Suffolk County, to Sunrise Highway.

Wetland and Waterbodies Delineation

The Applicant conducted a wetland delineation of the Onshore Facilities during the months of June and October 2020, including the Landfall/ICW Study Area on Fire Island, Landfall/ICW Study Area on the Mainland, and the Onshore Transmission Cable corridor. Field surveys along Victory Avenue segment, at the Union Avenue Site, and along the Onshore Interconnection Cable are planned for spring 2021. Wetland boundaries potentially regulated by NYS and/or federal jurisdiction were determined using the technical criteria described in the *Corps Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement* (USACE 2012). In addition, boundaries of freshwater wetlands regulated under Article 24 of the NYECL were delineated according to methods described in the *New York State Freshwater Wetlands Delineation Manual* (Browne et al 1995).

To date, a total of eight wetlands and three watercourses have been delineated within the Onshore Facilities. Details for each of these features are provided in Revised Table 4.7-1 and further details are provided in Appendix 4-E.

Revised Table 4.7-1. Summary of Wetland and Waterbody Resources Observed for Onshore Facilities

Project Component		Mapped Wetland and Waterbody Resources Documented via Desktop Review	Wetland and Waterbody Resources Identified in Field Survey
Landfall/ICW Study Area	Landfall Work Area	Wetlands • NYSDEC-mapped tidal wetlands (adjacent area) • NYSDEC-mapped estuarine wetlands (adjacent area)	Delineated Wetlands • Estuarine (W-01ASA, W-01ASB, and W-01CFA)
		Waterbodies • Atlantic Ocean (adjacent area) • Great South Bay (adjacent area)	Delineated Waterbodies • None
	ICW Work Area	Wetlands • NYSDEC-mapped tidal wetlands (adjacent area) • NYSDEC-mapped estuarine wetlands (adjacent area)	Delineated Wetlands • Palustrine (W-01ASC, and W-01CFB)
		Waterbodies • Narrow Bay (adjacent)	Delineated Waterbodies • None

Project Component	Mapped Wetland and Waterbody Resources Documented via Desktop Review	Wetland and Waterbody Resources Identified in Field Survey
Onshore Transmission Cable	Wetlands • NYSDEC-mapped freshwater wetlands at and adjacent to Carmans River crossing • NWI-mapped wetlands at Carmans River crossing	Delineated Wetlands • Palustrine (W-01CFC/01JRB and W-01CFD/01JRA) near Carmans River
	Waterbodies • Carmans River	Delineated Waterbodies • Watercourse S-01CF (Carmans River) • Watercourse S-02MA (tributary to Carmans River)
Union Avenue Site	Wetlands and Waterbodies • None	Wetlands and Waterbodies • None
Onshore Interconnection Cable	Wetlands and Waterbodies • NWI-mapped wetland	Wetlands and Waterbodies • Not assessed in the field

4.7.2 Potential Wetlands and Water Resources Impacts and Proposed Mitigation

This section describes the potential impacts to wetlands and waterbodies that may result from the construction and operation of the Project, along with the methods that the Applicant will implement to avoid, minimize, and mitigate those impacts to the maximum extent practicable.

Potential Construction Impacts and Proposed Mitigation

Potential direct impacts to wetlands and waterbody resources during construction of the Onshore Facilities will be avoided and minimized to the maximum extent practicable by locating Project infrastructure primarily in previously disturbed or developed areas (*i.e.*, roadways, ROWs, developed industrial/commercial areas). In those limited instances where direct impacts to NYSDEC-mapped wetlands or their regulated adjacent areas cannot be avoided, it is expected that most of the impacts will be temporary, and limited and the impacted area will be restored to pre-construction conditions to the maximum extent practicable. Potential direct or indirect impacts to wetlands and waterbody resources during construction of the Project are related to land disturbance, sediment suspension and deposition, discharges and releases, and trash and debris, as described below.

Potential direct impacts to wetlands and waterbody resources from land disturbance during construction will be avoided and minimized to the maximum extent practicable through the use of HDD methods (or other trenchless methods) at the SRWEC–NYS Landfall, crossing of the ICW and along Onshore Transmission Cable corridor where wetlands and waterbodies are identified. At the Landfall Work Area, the workspace will be largely limited to the developed areas (*i.e.*, parking lot and surface roads) use of HDD construction methods for transitioning the SRWEC–NYS to the Onshore Transmission Cable will avoid and minimize potential impacts to tidal wetlands and the regulated adjacent area. Use of HDD methods to cross the ICW will avoid land disturbance to tidal wetlands and use of HDD at the crossing of the Carmans River will avoid wetlands and the waterbodies to the maximum extent practicable.

Time of year restrictions for certain work activities (*e.g.*, HDD conduit stringing) will also be employed to the extent feasible to avoid or minimize direct impacts to wetlands and waterbody resources and the protected species that may use such habitats during construction of the SRWEC–NYS Landfall and Onshore Facilities. If work is anticipated to occur outside of these time-of-year restriction periods, the Applicant will work with NYS and federal agencies to develop appropriate construction monitoring and impact minimization plans. Additional information regarding potential impacts to terrestrial habitats and protected species is addressed in Section 4.6, Terrestrial Ecology and Wildlife.

Use of HDD methods is also expected to avoid direct impacts from sediment releases to surface waters, and tidal and freshwater wetlands. Where open trenching methods are used, construction activities will be limited to roadway and utility ROWs with use of appropriate erosion control measures. However, in the unlikely event that these measures do not work effectively, sediment suspension and deposition could occur within adjacent waterbodies or wetlands. These impacts will be temporary and properly mitigated, with water quality returning to pre-existing conditions quickly after the end of construction. The implementation of environmental protection measures including the Project's SWPPP, prepared as part of the Project EM&CP, during earth disturbance will further minimize impacts from disturbed sediments for Onshore Facilities.

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods, installation of the Onshore Transmission Cable or Onshore Interconnection Cable, or during construction activities at the OnCS-DC. A SPCC Plan will be developed and any discharges or release will be properly mitigated in accordance with the SPCC Plan to be prepared as part of the Project EM&CP and NYS regulations. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts; activities will be heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. Disposal of any solid waste or debris in the water will be prohibited. With proper waste management procedures, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Potential Operational Impacts and Proposed Mitigation

During operations of the Onshore Facilities, infrastructure associated with the Onshore Transmission Cable and Onshore Interconnection Cable will be located underground and will have no impact on wetlands or waterbody resources.

The Onshore Transmission Cable will be buried beneath the seabed of the ICW, between Bellport Bay and Narrow Bay. Any non-routine maintenance would occur through the HDD cable duct and would not impact the environment of the ICW or adjacent wetlands.

Routine maintenance of the Onshore Transmission Cable will primarily involve observation and testing of existing equipment. Non-routine maintenance may cause limited impacts to wetlands or waterbody resources for temporary access to assess damage and for repair or replacement of infrastructure, but such occurrences are expected to be infrequent, localized, and short-term and largely limited to developed roadway and utility ROWs. Any work near wetland or waterbody crossings will be governed by several environmental permits including the SPDES General Permit for Stormwater Discharges associated with Construction Activities which require the use of BMPs to minimize the opportunity for turbid discharges leaving a construction work area.

Operation of the OnCS–DC is not expected to impact wetlands or waterbody resources. The OnCS–DC will require various oils, fuels, and lubricants to support its operation. As described above in the construction section, although no impacts from discharges and releases are anticipated, accidental discharges, releases, and disposal could occur; however, risks will be minimized through implementation of the BMPs contained in the SPCC Plan to be prepared as part of the Project EM&CP.

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during operation of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on wetlands and water resources. These measures are based on protocols and procedures successfully implemented for similar projects:

- The SRWEC Landfall will be installed via HDD to avoid impacts to the dunes, beach, nearshore zones and coastal resources. The Onshore Transmission Cable will also be installed via HDD under the ICW and Carmans River to avoid impacts to wetland and water resources; HDD and trenchless methods will also be used elsewhere onshore, where appropriate, to avoid or minimize impacts to resource areas to the maximum extent practicable. Onshore Facilities are primarily sited within previously disturbed and developed areas (*e.g.*, roadways, ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts to undisturbed coastal and terrestrial habitat.
- An SWPPP, including erosion and sedimentation control BMPs and revegetation measures, will be implemented to minimize potential water quality impacts from construction and operation of the Onshore Facilities.
- Accidental spill or release of oils or other hazardous materials will be managed offshore through an ERP/OSRP and onshore through an SPCC Plan.
- Where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with the release of drilling fluids.
- Where appropriate, temporary erosion controls such as swales and erosion control socks will be installed and will be maintained until the site is restored and stabilized.
- The Applicant will comply with applicable international (International Maritime Organization International Convention for the Prevention of Pollution from Ships [IMO MARPOL]), federal (USCG), and NYS regulations and standards for treatment and disposal of solid and liquid wastes generated during all phases of the Project.

4.8 BENTHIC AND SHELLFISH RESOURCES

This section describes the benthic and shellfish resources identified within or proximate to the Project. Further, this section describes the potential impacts to benthic and shellfish resources that may result from the construction and operation of the Project, along with proposed methods that the Applicant will implement to avoid, minimize, and mitigate any potential impacts.

4.8.1 Existing Conditions for Benthic and Shellfish Resources

This section identifies the benthic and shellfish resources that may be present in the coastal and marine regions crossed by the SRWEC–NYS and Onshore Transmission Cable. Information was gathered by conducting a Project-specific field survey and reviewing current public data sources related to benthic and shellfish resources, including state and federal agency-published papers and databases (*e.g.*, LaFrance Bartley et al. 2018, NYSERDA 2017a, Poppe et al. 2014); online data portals and mapping databases (*e.g.*, Northeast Ocean Data 2020, USGS 2020); environmental studies; published scientific literature relating to relevant benthic habitat distribution; and correspondence and consultation with federal and state agencies. A description of the benthic and shellfish resources, including a summary of the results from site-specific benthic assessment surveys along the SRWEC–NYS corridor and within the ICW is provided below, followed by an evaluation of potential Project-related impacts. For the purposes of this analysis, discussion of benthic and shellfish resources within Great South Bay, Narrow Bay, and Bellport Bay were also included as these waterbodies are hydrologically connected and immediately adjacent to (and are therefore representative of) the ICW. More detailed information concerning the results of the site-specific benthic assessment survey and additional details on benthic resources are presented in Appendix 4-G.

Benthic habitats and the associated invertebrate communities serve important ecological functions in coastal and estuarine environments. Hard-bottom substrate, as well as emergent taxa, including SAV, associated with soft-bottom habitats, can provide important refuge and/or spawning sites for fish and shellfish. In addition to providing structural habitat, benthic invertebrates function as trophic links to higher-order consumers, including commercially valuable species. Benthic communities also contribute to other important ecosystem functions including influencing water quality and facilitating nutrient and carbon cycling.

The SRWEC–NYS corridor and ICW are generally characterized by predominantly mobile sandy substrate, and the associated benthic communities are adapted to survive in a dynamic environment. Benthic community assemblages and their associated ecological functions vary spatially and temporally across the SRWEC–NYS corridor and ICW. The physical attributes of the benthic environment, including sediment composition, hydrodynamics, and light availability, in addition to biological factors such as predation and competition, determine the species composition of benthic communities.

The site-specific benthic assessment surveys along the SRWEC–NYS corridor and ICW HDD found the majority of the surveyed area was characterized as soft-bottom environment. Across the surveyed area, bottom substrata composition was fully characterized using a combination of classifications, including CMECS Substrate Group obtained from PV images and sediment types derived from SPI analyses, both of which informed CMECS Substrate Subgroup classifications. These variables, in addition to macrohabitat type – a variable that integrates CMECS Substrate Group, maximum gravel size (when present), grain size major mode, and bedform presence/absence – provided a thorough depiction of the physical seafloor composition at each SPI/PV station.

Benthic habitat types, and specifically macrohabitat types, are used here as a construct to describe repeatable physical-biological associations and were derived from CMECS classifiers and modifiers obtained from the SPI/PV analysis. Each PV replicate image is between 2 and 5 sq ft (0.2 and 0.5 m^2) and the replicate images were collected within approximately 33 ft (10 m) of each other. Thus, this design can provide insight into the degree of patchiness of habitat features such as boulders and cobbles within this spatial context. This sampling approach cannot capture larger habitat features such as sand waves or smaller habitat features such as cracks and crevices on a boulder. Recognizing that scale is a critical component to habitat descriptions and delineations, the habitat types derived from the SPI/PV approach are most accurately described as macrohabitats, which are defined by Greene et al. 2007 as encompassing a scale of 3.2 to 33 ft (1 to 10 m). Further details on the methodology and results of the site-specific surveys are presented in Appendix 4-G, results are summarized in the sections below.

SRWEC–NYS

Along the SRWEC–NYS corridor, CMECS Substrate Subgroup, a variable incorporating information from both the PV and SPI, ranged from Very Fine Sand to Medium Sand, with no gravel documented. The predominant CMECS Substrate Subgroups characterized along the SRWEC–NYS were Very Fine Sand or Fine Sand; this mirrored the results documented by sediment type (SPI) (Figure 4.8-1). Straight and sinuous sand ripples occurred at the SPI/PV stations close to shore. Macrohabitat types were generally similar across the stations along the SRWEC–NYS corridor, consisting of sand, sand with ripples, or sand and mud. A distinct darker surficial layer was observed at many of the sandy shallow stations. This was likely an indication of benthic microalgae, as photosynthetically active radiation penetrates through the water column and has the potential to reach the seafloor. Sand dollars were frequently observed and were likely grazing on benthic microalgae. Other frequently observed benthic organisms along the SRWEC–NYS corridor included tube-building worms (e.g., *Diopatra sp.*) and hermit crabs (*Paguroidea*), which were common in the sand with ripples macrohabitats, as well as burrowing anemones (cerianthids) and mud snails, which often occurred in either the sand or sand and mud macrohabitats. All of these organisms are common taxa that are adapted to sandy and dynamic environments.

Shellfish Resources

A summary of ecologically and economically important shellfish species near or along the SRWEC–NYS corridor and their seasonal occurrence is provided in Revised Table 4.8-1, below. Northern quahog clam, Eastern oyster, Atlantic rock crab, Atlantic surf clam, and horseshoe crab tend to prefer shallow water habitats and are thus expected along the SRWEC–NYS corridor.

Table 4.8-1 includes a summary of these species, likelihood of presence, and the potential time of year that they could be present in the region. The relative occurrence noted in Table 4.8-1 is based on five qualitative categories, which are defined as follows:

- **Common**. Species occurs consistently in moderate-to-large numbers.
- **Regular**. Species occurs in low to moderate numbers on a regular basis or seasonally.
- **Uncommon**. Species occurs in low numbers or on an irregular basis.
- **Rare**. Species records are available for some years but are limited.
- **Not expected**. Species' range includes the SRWEC–NYS corridor and/or ICW, but due to habitat preferences and distribution information, species is not expected to occur in the SRWEC–NYS corridor or ICW although records may exist for adjacent waters.

Revised Table 4.8-1. Ecologically and Economically Important Shellfish Species and Their Potential to Occur in the SRWEC–NYS Corridor and ICW

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Relative Occurrence in the SRWEC–NYS	Relative Occurrence within the ICW	References
American lobster (*Homarus americanus*)	All	Prefers rocky habitat, including mixed bottom types, but may burrow in featureless sand or mud habitat.	Year-round	Uncommon	Uncommon	ASMFC 2020a; Cobb and Wahle 1994; Collie and King 2016; DENC 2019; Tanaka and Chen 2015; USFWS 1997
Atlantic rock crab (*Cancer irroratus*)	All	Prefers depths ranging from 20 to 1,496 ft (6 to 456 m), but most common in waters less than 65 ft (20 m) deep. Prefers rocky and gravely substrate but also occurs in sand.	Year-round	Common	Common	Krouse 1980; Robichaud et al. 2000; Williams and Wigley 1977; USFWS 1997
Atlantic sea scallop (*Plactopecten magellanicus*)	All	Found on sand, gravel, shells, and other rocky habitat. Larvae settle out on gravel and rocky substrate. Found from mean low water to depths of 656 ft (200 m). This species also has designated EFH along the SRWEC-NY corridor	Year-round	Rare	Not expected	Hart and Chute 2004; Mullen and Moring 1986; NEFSC 2004a; Stokesbury and Bethoney, 2020; Tanaka et al. 2020; Torre and Chen 2020
Atlantic surf clam (*Spisula solidissima*)	All	Prefers depths ranging from 26 to 216 ft (8 to 66 m) in medium-grained sand, but may also occur in finer-grained sediments. Burrows up to 3 ft (0.9 m) below the sediment-water interface.	Year-round	Regular	Not expected	Bricelj 2009; Cargnelli et al. 1999a; Fay et al. 1983; Meyer et al. 1981; Northeast Ocean Data 2020
Blue mussel (*Mytilus edulis*)	All	Juveniles and adults settle in areas of complex habitat and within eelgrass communities.	Year-round	Rare	Common	Bartley et al. 2018; Bologna et al. 2005; USFWS 1997
Channeled whelk (*Busycotypus canaliculatus and B. carica*)	All	Commonly found in nearshore and offshore environments, but preferred depth range is not known. Occurs in sandy and fine-grained sediments where they can bury themselves. Eggs are laid on sand in intertidal and subtidal areas.	Year-round	Common	Common	Cockrell et al. 2015; Fisher 2009; Fisher and Rudders 2017; Lynn and Tettelbach 2017; Peemoeller and Stevens 2013; Stevens and Peemoeller 2016
Eastern oyster (*Crassostrea virginica*)	All	Common in estuarine and inshore reef habitats between depths from 2 to 16 feet (0.6-5m).	Year-round	Uncommon	Regular	Gosner 1987; NOAA Fisheries 2007; USFWS 1997

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Relative Occurrence in the SRWEC-NYS	Relative Occurrence within the ICW	References
Hard clam (*Mercenaria mercenaria*)	All	Adults and juveniles are commonly found in intertidal and shallow subtidal waters. Eggs and larvae are planktonic and settlement occurs over sandy substrata.	Year-round	Regular	Common	Gosner 1987; Henry and Nixon 2008; Kraeuter et al. 2005; NOAA Fisheries 2007; USFWS 1997
Hermit crab (*Pagurus pollicaris*)	All	Adults and juveniles are common in shallow subtidal sandy habitats and salt marshes. Eggs and larvae are planktonic.	Year-round	Common	Common	Barnegat Bay Partnership 2020; Gosner 1987
Horseshoe crab (*Limulus polyphemus*)	All	Prefer depths shallower than 98 ft (30 m) but known to occur in depths greater than 656 ft (200 m). Occurs commonly on sandy substrate but is a habitat generalist and may be found on gravel and cobbles as adult. During full moon tides in spring and summer, migrates inshore to shallow bays and sandy beaches to spawn. Juveniles use shallow nearshore areas as nurseries before moving into deeper waters.	Year-round	Common	Common	ASMFC 2019, 2020b; Bonzek et al. 2017; NJDEP 2016; Smith et al. 2017
Jonah crab (*Cancer borealis*)	Adults	Prefers depths ranging from 164 to 984 ft (50 to 300 m), but also occurs in shallower waters, perhaps associated with circadian rhythms. Found across sediment types, from sand, to small gravel, to rocky areas.	Year-round	Rare	Not expected	ASMFC 2018, 2020; Jeffries 1966; NYDEC 2020; Robichaud and Frail 2006; Truesdale et al. 2019
Longfin squid (*Doryteuthis pealei*)	All	May-November found in inshore waters, and adults are demersal during the day. Eggs are laid on a variety of substrates, including sand and hard bottom. Newly hatched squid become demersal then migrate to offshore waters. December-April: Offshore waters between 328 and 550 ft (100 and 168 m) deep. This species also has	May-November	Regular	Regular	Bonzek et al. 2017; Cargnelli et al. 1997; Hatfield and Cadrin 2002; Macy and Brodziak 2001; NEFSC 2005

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Relative Occurrence in the SRWEC–NYS	Relative Occurrence within the ICW	References
		designated EFH in portions of the SRWEC–NYS corridor				
Northern shortfin squid (*Illex illecebrosus*)	Adults	Prefers depths ranging from 328 to 656 ft (100 to 200 m), but is also known to occur in waters shallower than 60 ft (18 m). Egg masses are thought to be neutrally buoyant.	Summer through early fall	Uncommon	Not expected	Black et al. 1987; Grinkov and Rikhter 1981; Hendrickson and Holmes 2004; O'Dor and Balch 1985
Ocean quahog clam (*Artica islandica*)	Juveniles and Adults	Prefers depths ranging from 82 and 200 ft (25 and 61 m) in medium to fine grain sand.	Year- round	Rare	Not expected	Cargnelli et al. 1999b
Sand shrimp (*Crangon septemspinosa*)	Juveniles and Adults	Migrates to deeper waters out of estuaries in the fall as water temperatures decrease, returning in the spring when temperatures increase.	Spring through fall	Common	Common	Gosner 1987; Sagarese et al. 2011; Save the Bay 1998; Taylor and Collie 2003
Spider crab (*Libinia emarginata*)	Juveniles and Adults	Occurs in shallow subtidal nearshore habitats and on the continental shelf to depths approaching 164 ft (50 m).	Year-round	Common	Common	Bologna et al. 2005; Degoursey et al 1992

NOTE:

The potential for each species to occur near or within the SRWEC–NYS corridor is related to the distribution of benthic habitat types within each area.

Macroalgal Assemblages

Macroalgae are distributed in subtidal and intertidal zones with sufficient light levels to support photosynthesis. Although no macroalgae were observed at any of the SPI/PV stations along the SRWEC–NYS corridor (Appendix 4-G), the depth within it is suitable for macroalgae, and, if present, would be expected to primarily consist of floating algal masses and drifting algae, such as sea lettuce (*Ulva lactuca, U. compressa, U. rigida*) or wire weed (*Ahnfeltia plicata*). Common macroalgal species that could potentially occur along or within the vicinity of the SRWEC–NYS corridor include coralline red algae (*Order Corallinales*), encrusting macroalgae (*e.g., Hildenbrandia sp.*), foliose red algae (*Phylum Rhodophyta*), green thread (*Chaetomorpha linum*), gut weed (*Ulva intestinalis*), hooked red weed (*Bonnemaisonia hamifera*), horsetail kelp (*Laminaria digitata*), Irish moss (*Chondrus crispus*), kelp (*Saccharina latissimi, S. longicruris*), lacy red weed (*Callophyllis cristata*), purple claw weed (*Cystoclonium purpureum*), red alga (*Gracilaria vermiculophylla*), and Sargasso weed (*Sargassum filipendula*) (DiPreta 2019; Green-Gavrielidis et al. 2018; Guidone and Thornber 2013; McGonigle et al. 2011; Shimada et al. 2003; Vadas and Steneck 1988; Van Patten and Yarish 2009; Watson et al. 2018).

Onshore Facilities

To the north of Fire Island is Great South Bay, which is further divided into smaller embayments, including Moriches Bay, Narrow Bay, and Bellport Bay. The Onshore Transmission Cable will transit under the narrow channel of the ICW between Bellport Bay and Narrow Bay near Smith Point County Park in the Town of Brookhaven. A recent study by the NPS (LaFrance Bartley et al. 2018) investigated and mapped benthic habitats at sites along the northern shore of Fire Island and near the recent breach (East Breach, also called Old Inlet Breach) to Bellport Bay that was formed after Hurricane Sandy in 2012. The study found these shallow areas to be predominantly sandy, with distinct sand flats, sand waves, and small sand dunes. In locations east of the new breach and west of Smith Point are areas of dense amphipod tube-mats (*Ampelisca spp.*) associated with clay-silt substrate, mature dense blue mussel beds in both coarse sand and clay-silt environments, and patches of seagrass in sandy substrate (LaFrance Bartley et al. 2018). The opening of the inlet (East Breach or Old Inlet Breach) to Bellport Bay created extensive changes to the flushing and circulation dynamics as well as salinity and light availability, all of which influence the benthic communities, generally improving water and sediment quality in this region (Gobler et al. 2019).

The benthic assessment survey, conducted September 7-9, 2020, within the ICW and consisting of PV image collection and sediment grab sampling, corroborated these previous benthic studies. The SPI/PV stations flanking the channel between Narrow Bay and Bellport Bay on the north and south side of the ICW were characterized by CMECS Substrate Group Sand or Finer, while the SPI/PV stations in the center of the ICW were classified as Sandy Gravel (Figure 4.8-2). Tufts of floating macroalgae were observed at the majority of stations sampled within the ICW. Other frequently observed taxa included hermit crabs, encrusting tube-building worms (serpulids), and dense mats of tube-building taxa on soft sediment (*e.g.*, Ampelisca and/or spionids) (Appendix 4-G).

Submerged Aquatic Vegetation

SAV are rooted, submerged vascular plants that grow completely underwater within shallow waters with sufficient light to support photosynthesis. SAV beds, including both eelgrass (*Zostera marina*) and Widgeon grass (*Ruppia maritima*) are found in the shallow bays north of Fire Island (LaFrance Bartley et al. 2018; NYSDEC 2019a; NYSDOS et al. 2020). Great South Bay is the largest protected, shallow, coastal bay in NYS, and SAV beds within the bay are utilized as forage and nursery habitat for a variety of species identified as commercially—or recreationally—important, including summer flounder, winter flounder, bluefish, and black sea bass (USFWS 1991). A site-specific PV and video survey was conducted September 7-9, 2020, within the ICW to assess the benthic environment and document seagrass in the vicinity of the HDD corridor. As detailed in Appendix 4-G, a towed video sled was deployed along 22 transects within 328 ft (100 m) of the HDD corridor. SAV was observed at six locations from the ICW video footage. These observations included small, solitary SAV (*Zostera marina*) shoots within a dense macroalgal bed located on the north side of the ICW. Given the low densities that were observed, these isolated SAV shoots would not be considered an SAV bed habitat (*i.e.*, a single shoot for each observation). It was also not clear whether or not these SAV shoots were rooted in the sediment or had been uprooted and deposited within the macroalgal beds. Still images from the video footage capturing each SAV observation are provided in Appendix 4-G. No SAV beds were documented, and no shoots were observed on the south side of the ICW (north of Fire Island) where they had previously been reported (NYSDOS 2020) (Figures 4.8-1, 4.8-2).

Shellfish Resources

Bivalve restoration projects, including oysters and hard clams, are ongoing in Bellport Bay, in collaboration with the Town of Brookhaven, Cornell Cooperative Extension Marine Program, and Friends of Bellport Bay. Over the past several years, hatchery-reared juvenile oysters and hard clams sourced from the mariculture facility on Cedar Beach in Mt. Sinai have been planted at locations within Bellport Bay, including near Ridge Island (White 2015), which is approximately 2.2 mi (1.9 nm, 3.5 km) from the planned ICW HDD corridor. In addition to this ongoing restoration work, in 2018/19 the NYSDEC Long Island Shellfish Restoration Project (LISRP) in collaboration with Cornell Cooperative Extension, Stony Brook University, municipalities, local businesses, and volunteer organizations, established a shellfish sanctuary site in Bellport Bay with the goals of improving water quality, restoring native shellfish populations and biodiversity, and creating jobs and educational opportunities (NYSDEC 2021). The Bay was stocked with adult and juvenile clams and spat-on-shell oysters. Monitoring is ongoing to evaluate water quality improvements and shellfish enhancement (Barnes 2018).Bivalves serve important ecological function by improving water quality through filtration and facilitating sediment nitrogen cycling processes that may remove nitrogen pollution from the ecosystem (*e.g.*, Kreeger et al. 2018). Previous hard clam restoration efforts in Bellport Bay failed, likely due to stressors, including high nitrogen levels that fuel frequent brown tides (*Aureococcus anophagefferens*), in the area that were detrimental to existing hard clams (Bricelj et al. 2001). However, the recent breach (Hurricane Sandy in 2012) that created an inlet from the Atlantic Ocean into Bellport Bay may improve water quality and support bivalve production (Gobler et al. 2019).

4.8.2 Potential Benthic and Shellfish Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to benthic and shellfish resources and proposed mitigation.

Potential Construction Impacts and Mitigation

This section evaluates potential construction impacts to benthic and shellfish resources expected to result from the installation of the Project and presents proposed mitigation measures, as applicable.

SRWEC–NYS

The SRWEC–NYS will be sited to avoid and minimize impacts to sensitive habitats (*e.g.*, hard bottom habitats) to the extent practicable. To the extent feasible, the SRWEC–NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The effects on proposed changes to the physical and biological processes of aquatic plant or wildlife are expected to be similar, regardless of the specific burial depth between 3 to 7 ft (1 to 2 m). For example, whether the cable is buried 3 or 7 ft (1 to 2 m), the sessile and slow-moving benthic organisms within the vicinity of the cable installation activity are expected to experience mortality because benthic organisms live only within the first 8 to 10 in (20 to 25 cm) of the sediment column.

The SRWEC–NYS Landfall will be installed via HDD to avoid impacts to the dunes, beach, nearshore zones and benthic resources. To the extent feasible, installation of the SRWEC–NYS will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options are anticipated to result in less habitat modification than dredging options. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.

Potential direct and indirect impacts to benthic and shellfish resources during construction of the SRWEC–NYS are anticipated to be associated with physical disturbance and sediment suspension and deposition during seafloor preparation activities and installation of the cable, and indirect impacts from potential discharges and releases, and trash and debris, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs, and are likely to be localized, with benthic and shellfish resources returning to pre-existing conditions after in-water activities cease.

Construction of the SRWEC–NYS will involve seafloor preparation activities, including boulder relocation and sand wave leveling, cable installation, installation of cable protection along portions of the SRWEC–NYS, vessel anchoring (including spuds), and HDD exit pit excavation. These activities will cause seafloor disturbance and habitat alteration.

Boulder clearance associated with seafloor preparation is expected to have direct impacts on benthic and shellfish resources in the limited areas it may be required within NYS waters along the 98 ft (30 m) wide SRWEC—NYS corridor. Loss of attached fauna is expected during boulder relocation. Boulders will be placed in new locations, creating new physical configurations in relation to nearby boulders and are not expected to return to pre-Project conditions. However, these relocated boulders are expected to return to their pre-Project habitat function with relatively rapid (< 1 year) recolonization expected (Guarinello and Carey 2020). Additionally, boulder relocation may result in aggregations of boulders, creating new features that may serve as high value habitat. For example, this increased complex structured habitat may benefit juvenile lobsters and fish by providing an opportunity for refuge compared to surrounding patchy habitat.

Installation of cables and cable protection will occur at the same location on the seabed and therefore is expected to have similar direct short-term impacts on benthic and shellfish resources in these areas. The impacts from these activities are expected to affect sessile and slow-moving organisms differently than mobile benthic species, and impacts are anticipated to vary with bottom type as well as cable installation methodology. Sessile and slow-moving benthic species, including infaunal species, eggs, and larvae that cannot avoid seafloor preparation or cable installation equipment, may be subject to mortality and injury if they are present within the impact area during construction. These organisms may experience entrainment in the jet plow or pumps. Additionally, the installation of scour protection could crush and/or displace benthic species, particularly sessile species and eggs and larvae within the impact area of the foundations and scour protection. Because of the slow speed of the seafloor preparation and cable installation equipment and limited size of the impact areas, it is expected that most mobile benthic species will be able to avoid these activities and will not be subject to mortality or injury but may still experience some direct impact.

Construction of the SRWEC–NYS Landfall will be accomplished with HDD methodology. HDD installation will involve the excavation of HDD exit pits offshore within the surveyed corridor. Depending on the cable specifications and the seafloor characteristics, these exit pits (a total of three) will be a maximum of 164 ft x 49 ft x 16 ft (50 m x 15 m x 5 m) (length x width x depth). This activity could cause injury or mortality to benthic species, particularly infauna, immobile, or slow-moving species in the direct vicinity of the excavation, and negatively affect their habitats. The impacts associated with this activity will be short-term, ceasing after the construction is complete in a given area. Seafloor disturbance from HDD exit pit excavation will encompass a small area of similar available benthic habitat in the region, with dredged material being placed either within the vessel and disposed of on-site or at an appropriate disposal site. Alternatively, the dredged material may be placed beside the trench and used after cable lay for backfilling. Specific details on provisions for handling excavated materials will be provided in the Project EM&CP.

Vessel anchoring (including spuds from jack-up vessels) could cause mortality or injury to slow-moving or sessile benthic species within the impact areas of the spuds and/or anchors. The extent of vessel anchoring impacts will vary, depending on the vessel type, number of vessels, and duration onsite, but are expected to be smaller in spatial extent than other seafloor-disturbing construction activities. Proposed mitigation includes the use of DP vessels for installation of the SRWEC–NYS to the extent practicable. DP vessels minimize seafloor impacts, as compared to use of a vessel relying on multiple anchors. A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.

In areas of sediment disturbance, benthic habitat recovery and benthic infaunal and epifaunal species abundances may take up to one to three years to recover to pre-impact levels (*e.g.*, AKRF, Inc. et al. 2012; Germano et al. 1994; Hirsch et al. 1978; INSPIRE 2016; Kenny and Rees 1994). Based on a review of impacts of sand mining in the US Atlantic and Gulf of Mexico, softbottom communities within the cable corridors are expected to recover within 3 months to 2.5 years (BOEM 2015; Brooks et al. 2006; Kraus and Carter 2018; Normandeau 2014). Recovery time also varies somewhat with the method of installation, with more rapid recovery after plowing than jetting (Kraus and Carter 2018). Benthic habitat recolonization rates depend on the benthic communities in the area surrounding the affected region. Sand sheet and mobile sand with gravel habitats are often more dynamic in nature; therefore, they are quicker to recover than more stable environments, such as fine-grained (*e.g.*, silt) habitats and rocky reefs (Dernie et al. 2003). Species inhabiting these dynamic habitats are adapted to deal with physical disturbances, for example, frequent sedimentation associated with strong bottom currents and ground swell. In areas with cobble and boulder habitat, the benthic organisms are not well adapted to frequent sedimentation and, therefore, may take longer to begin to recolonize after the disturbance. Mobile species may also be indirectly affected by the temporary reduction of benthic forage species, but these impacts are expected to be minor given the limited amount of habitat that will be disturbed and the availability of similar habitats in the area.

Seafloor-disturbing activities will also result in temporary increases in sediment suspension and deposition. Within the SRWEC–NYS corridor, HDD exit pits (one per HDD) will be dredged. Sediment transport modeling was performed using the Particle Tracking Model (PTM) in the Surface-Water Modeling System, which is a two-dimensional Lagrangian particle tracking model developed by the Coastal Inlets Research Program (CIRP) and the Dredging Operations and Environmental Research Program (DOER) at the USACE Research and Development Center. The PTM required input bottom currents (velocity and direction), which were obtained from the Northeast Coastal Ocean Forecast System hydrodynamic model. The models, inputs, and results are described in detail in Appendix 4-H.

For the SRWEC–NYS installation, modeling results indicated that peak total suspended solids (TSS) concentrations reached 141 milligrams per Liter (mg/L) with concentrations exceeding 100 mg/L within 120 m of the SRWEC–NYS corridor centerline. The maximum predicted deposition thickness was 0.4 in (10.1 millimeters [mm]) resulting in a small area (0.0037 acres [0.0015 ha]) having a thickness greater than 10 mm with a maximum extent of 25 ft (7.5 m) from the SRWEC–NYS corridor. While the time to return to ambient turbidity levels will vary along the SRWEC–NYS corridor, the predicted time to return to ambient levels was 0.3 hours after installation completion. The excavation of HDD pits resulted in peak TSS concentrations of 60 mg/L with concentrations exceeding 50 mg/L within 115 ft (35 m) of the sediment source. This activity resulted in a 0.17-acre (0.07-ha) area on the seafloor where the deposition thickness was greater than 0.4 in (10 mm), extending a maximum of 118 ft (36 m) from the source. The predicted time to return to ambient turbidity levels is was 1.2 hours after completion. Additional information on methods and results of the sediment transport analysis are described in Appendix 4-H.

Suspension of sediments into the water column and the redistribution of sediments that fall out of suspension could result in mortality of benthic organisms through smothering and irritation to respiratory structures, particularly sessile species and species with limited mobility. Mobile organisms are expected to temporarily vacate the area and move out of the way of incoming sediments (MMS 2007). Most marine species have some degree of tolerance to higher concentrations of suspended sediment because storms, currents, and other natural processes regularly result in increases in turbidity (MMS 2009). However, eggs and larval organisms are especially susceptible to smothering through sedimentation. Also, smaller organisms are likely more affected than larger organisms, as larger organisms may be able to extend feeding tubes and respiratory structures above the sediment (U.K. Department for Business Enterprise and Regulatory Reform 2008).

Maurer et al. (1986) found that several species of marine benthic infauna (*e.g.*, the clam *Mercenaria mercenaria*, the amphipod *Parahaustorius longimerus*, and the polychaetes *Scoloplos fragilis* and *Nereis succinea*) exhibited little to no mortality when buried under up to 3 in (8 cm) of various types of sediment (from predominantly silt-clay to pure sand). The modeling results indicate that sedimentation from SRWEC–NYS construction is not expected to exceed 0.4 in (10 mm) of deposition.

Construction equipment and vessels are expected to generate underwater noise during construction of the SRWEC–NYS. It is thought that marine invertebrates are sensitive to particle motion rather than sound pressure, detecting acoustic energy with sensory organs such as mechanoreceptor hairs, chordotonal organs, statocysts and statoliths (Jones et al. 2020; Popper and Hawkins 2018; Vella et al. 2001). Several studies have documented the responses of different marine invertebrates to natural and anthropogenic vibration, although no exposure criteria have been established (as reviewed in Roberts and Elliot 2017).

Several recent studies have focused on determining threshold detection and responses of cephalopods to underwater noise. Cephalopods, including cuttlefish, octopus, and squid species, are sensitive to particle motion rather than sound pressure (*e.g.*, Mooney et al. 2010; Packard et al. 1990), with the lowest particle motion thresholds reported at 1 to 2 hertz (Hz) (Packard et al. 1990). Particle motion thresholds were measured for longfin squid between 100 and 300 Hz, with a threshold of 110 decibel (dB) relative to 1 micro-Pascals (µPa) reported at 200 Hz (Mooney et al. 2010). No other studies have measured particle motion. Specific hearing thresholds for sound pressure at higher frequencies have been reported for the oval squid (*Sepiooteuthis lessoniana*) and the common octopus (134 and 139 dB re 1 µPa at 1,000 Hz, respectively) (Hu et al. 2009).

Cephalopods appear to be particularly sensitive to low frequency sound. Sole et al. (2017) estimated that trauma onset may begin to occur in cephalopods at root-mean-square sound pressure levels (SPL) from 139 to 142 dB re 1 µPa at one-third octave bands centered at 315 Hz and 400 Hz. Low frequency continuous noise (2 hours of 50 to 400 Hz at received SPL of 157 dB re 1 uPa) resulted in lesions on the sensory hair cells of the statocysts, which worsened over time, in several cephalopod species (André et al. 2016; Sole et al. 2013).

Decapod crustaceans, including crab, lobster, and shrimp species, detect sound through an array of hair-like receptors within and upon the body surface that potentially respond to water- or substrate-borne vibrations. These organisms also have proprioceptive organs that could serve secondarily to perceive vibrations (as reviewed in Popper et al. 2001). While it is thought that decapod crustaceans would be most sensitive to particle motion, studies have focused on SPL measurements. Given the experimentally determined sensitivities of blue mussel (*Mytilus edulis*) and common hermit crab (*Pagurus bernhardus*) to particle motion (Roberts et al. 2015, 2016), this modelled particle velocity would likely elicit behavioral response from these organisms (Roberts and Elliot 2017; Roberts et al. 2017). Prawns (*Palaemon serratus*) showed auditory sensitivity to sounds from 100 to 3,000 Hz (Lovell et al. 2005, 2006). Prawns showed greatest sensitivity at a SPL_{rms} of 106 dB re 1 µPa at 100 Hz, although this was the lowest frequency tested, so prawns might be more sensitive at frequencies below this (Lovell et al. 2005).

Sessile invertebrates such as bivalves may respond to sound exposure by closing their valves (*e.g.*, Kastelein 2008; Roberts et al. 2015; Solan et al. 2016) much as they do when water quality is temporarily unsuitable. In one study, the duration of valve closure was shown to increase with increasing vibrational strength (Roberts et al. 2015). Clams may respond to anthropogenic noise by reducing activity and moving to a position above the sediment-water interface, which affects ecosystem processes such as bioirrigation, as documented in the clam *Ruditapes philippinarum* (Solan et al. 2016).

In response to noise associated with construction at the SRWEC–NYS, it is expected that mobile macroinvertebrates temporarily relocate during construction and therefore not be in the areas of greatest acoustic stressors. Indirect impacts on benthic species may also result from a temporary degradation of habitat quality due to elevated noise levels associated with construction activities. Noise may temporarily reduce benthic habitat quality for exposed species.

Sounds created by mechanical/jet plows and vessels are continuous and non-impulsive sounds. Benthic species in the vicinity of Project construction vessels or mechanical/jet plows may be affected by associated noise, but the duration of the disturbance will occur over a very short period at any given location. Limited research has been conducted on underwater noise from mechanical/jet plows. Generally, the noise from this equipment is expected to be masked by louder sounds from vessels. The noise generated by vessels will be similar to the range of noise from existing vessel traffic in the region and is not expected to substantially affect the existing underwater noise environment.

Project-related marine vessels operating during construction will be required to comply with regulatory requirements for management of onboard fluids and fuels, including prevention and control of discharges. Trained, licensed vessel operators will adhere to navigational rules and regulations, and vessels will be equipped with spill containment and cleanup materials. Additionally, the Applicant will comply with applicable international (IMO MARPOL), federal (USCG), and NYS (NYSDEC) regulations and standards for reporting treatment and disposal of solid and liquid wastes generated during all phases of the Project.

All vessels will similarly comply with USCG standards regarding ballast and bilge water management. Liquid wastes from vessels (including sewage, chemicals, solvents, and oils and greases from equipment) will be properly stored, and disposal will occur at a licensed receiving facility. Any unanticipated discharges or releases are expected to result in minimal, temporary impacts; activities are heavily regulated and unpermitted discharges are considered accidental events that are unlikely to occur. In the unlikely event that a reportable spill were to occur, the National Response Center would be notified, followed by the EPA, USCG and NYSDEC.

Additionally, HDD at the Landfall will use a drilling fluid that consists of bentonite, drilling additives, and water. A barge or jack-up vessel may also be used to assist the drilling process, handle the pipe for pull in, and help transport the drilling fluids and mud for treatment, disposal, and/or reuse. To minimize the potential risks for an inadvertent drilling fluid release, an Inadvertent Return Plan will be developed as part of the Project EM&CP and implemented during construction.

Any active vessel operating within a marine environment has the potential to create trash and debris. In accordance with applicable federal, NYS, and local laws, the Applicant will implement comprehensive measures prior to and during Project construction activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. All trash and debris will be properly stored on vessels for later disposal of on land at an appropriate facility per 30 CFR 585.626(b) (9). Trash and debris returned to shore will be disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any other form of solid waste or debris in the water will be prohibited, and good housekeeping practices will be implemented to minimize trash and debris in vessel work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. With proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Onshore Facilities

The Onshore Transmission Cable will be sited to avoid and minimize impacts to sensitive habitats (*e.g.*, SAV habitats) to the extent practicable. As relevant to this section, the Onshore Transmission Cable will be installed via HDD under the ICW to avoid impacts to benthic and shellfish resources. Potential impacts to benthic and shellfish resources during construction of the ICW HDD could be associated with potential discharges and releases, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs.

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods and installation of the Onshore Transmission Cable. An SPCC Plan will be developed, and any discharges or release will be governed by NYS regulations. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts; activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Potential Operation Impacts and Mitigation

This section evaluates potential impacts to benthic and shellfish resources that are expected to result from the operation of the Project and presents proposed mitigation measures, as applicable.

SRWEC-NYS

Minimal impacts on benthic resources and shellfish are expected from operation of the SRWEC-NYS as it will be buried beneath the seabed. As discussed in more detail below, seafloor disturbance during operation of the SRWEC-NYS is only expected during non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection. Indirect impacts may also occur from potential discharges and releases and trash and debris during non-routine maintenance, as described below. These maintenance activities and associated vessel anchoring are expected to be limited to specific areas along the SRWEC-NYS corridor. Finally, as described below, and in Section 4.13, EMF, once the SRWEC-NYS becomes energized, the cables will produce a magnetic and induced electric field around the cables, and potential impacts to benthic and shellfish resources may occur.

Cable protection (*e.g.*, concrete mattresses or rock berms) may be placed in select areas along the SRWEC-NYS. The introduction of engineered concrete mattresses or rock to areas of the seafloor can cause local disruptions to circulation, currents, and natural sediment transport patterns, though these impacts are expected to be insignificant given the miniscule surface area associated with the cable protection compared to the surrounding waters. Under normal circumstances these segments of the SRWEC-NYS are expected to remain covered by sediment and associated cable protection (where applicable). In non-routine situations, these segments may be uncovered and reburial might be required. The seafloor overlaying the majority of buried SRWEC-NYS (where cable protection will not exist) is expected to return to pre-construction conditions over time and no long-term changes to sediment mobility or depositional patterns are expected.

The protection of the cable with any concrete mattresses or rock berms that may be required along certain areas of the SRWEC–NYS corridor will result in the long-term conversion of soft bottom habitat to hard bottom habitat. The use of gravel, boulders, and/or concrete mats will create new hard substrate that is expected to be initially colonized by barnacles, tube-forming species, hydroids, macroalgae, and other fouling species found on existing hard bottom habitat in the region. Cable protection will typically have crevices that increase structural complexity of the area and attract finfish and invertebrate species seeking shelter, including crabs and American lobster. For example, Jonah crabs appear to be attracted to rocky habitats with crevices (NOAA Fisheries 2018b). Lobster associate preferentially with boulders and transition zones around boulders (Collie and King 2016). An offshore wind farm in the United Kingdom reported initial aggregations of European lobster following construction; studies on long-term effects on lobster densities are ongoing (Roach et al. 2018).

Increases in sediment suspension and deposition during the operational phase may result from vessel anchoring and non-routine maintenance activities that require exposing portions of the SRWEC–NYS. Increases in sediment suspension and deposition will impact sessile and slow-moving species more than mobile species. These impacts will be similar to those discussed for the construction phase, but on a more limited spatial scale.

Once the SRWEC–NYS becomes energized, the cables will produce a magnetic field around the cables the strength of which decreases rapidly with distance as described further in Section 4.13, EMF. Exposure to EMF could be short- or long-term, depending on the mobility of the species (Love et al. 2015, 2016; UK Department for Business Enterprise and Regulatory Reform 2008; Woodruff et al. 2012).

While certain fish and crustacean species are known to detect EMF (Gill et al. 2014; Taormina et al. 2018), the ability of soft-bodied benthic invertebrates to detect EMF is not as well understood. Modeled effects of EMF from the subsea cables at the Virginia Offshore Wind Technology Advancement Project site were found not to adversely affect benthic habitats (BOEM 2015). EMF from subsea cables associated with the Block Island Wind Farm were determined to have no effect on sturgeon or on any prey species of sturgeon (NOAA Fisheries 2015). The finding that neither sturgeon nor their prey would be affected by EMF can be extrapolated to the dominant benthic species; the Atlantic sturgeon is a bottom feeder reported to prefer polychaetes and arthropods (Johnson et al. 1997).

There are mixed results on the effects of static magnetic field sourced from DC cables on invertebrates. Crustacean, echinoderm, and polychaete species were found to not have a clear response to static magnetic fields of 27,000 mG (Bochert and Zettler 2004). Dungeness crab exposed to 10,000 mG DC magnetic fields were more likely to exhibit changes in activity, spending less time buried in sand (Woodruff 2013). Juvenile European lobster were unaffected by exposure to artificial static magnetic fields up to 2,300 mG (Taormina et al. 2020). Crabs (*Cancer pagurus*) were more likely to inhabit shelter and reduce foraging time during exposure to static magnetic fields (28,000 to 400,000 mG) (Scott et al. 2018). Thus, the modeled magnetic-field strength at peak loading from DC cables (989 mG including 506 mG due to Earth's geomagnetic field) is below levels at which documented these effects were observed in the laboratory.

Field surveys on the behavior of large crab species and lobster at submarine cable sites (Hutchison et al. 2018; Love et al. 2017) suggest that the Project's calculated magnetic-field levels (Revised Appendix 4-J – Magnetic-Field Assessment in New York) are not likely to impact the distribution and movement of large epibenthic crustaceans. Hutchison et al. (2018, 2020) assessed the responses of American lobster to an HVDC cable under field conditions and concluded that EMF resulted in small-scale changes in lobster distribution within the cages, although the cable was not observed to present a barrier to movement. In contrast, two marine crabs on the Pacific coast (Dungeness crab [*Metacarcinus magister*] and *Cancer productus*) were reported to be insensitive to EMF from energized subsea cables (Love et al. 2017). Based on the fact that behavioral responses to magnetic fields are not expected along cables, changes in species abundance and distributions due to EMF are not expected to occur.

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SRWEC–NYS was performed and results are included in Revised Appendix 4-J. The modeling provides maximum magnetic and induced electric fields associated with SRWEC–NYS for the DC cable. The cable will be shielded and buried beneath the seafloor do not directly emit electric fields into surrounding areas but are surrounded by magnetic fields that can cause induced electrical fields in moving water (Gill et al. 2012). Calculated DC magnetic-field deviations from the SRWEC–NYS at a minimum assumed edge-of-ROW distance of ±10 ft (3 m) from the cable centerline are less than 200 mG (and are well below the International Committee on Electromagnetic Safety [ICES] and International Commission on Non-Ionizing Radiation [ICNIRP] exposure limits). The NYSPSC limit for AC magnetic field levels at the edge of the right-of-way is 200 mG. Based on the modeling results (Revised Appendix 4-J) and existing evidence, the EMF associated with the SRWEC–NYS will be below the detection capability of most invertebrate species and are unlikely to result in measurable impacts on benthic invertebrate species. Therefore, no magnetic field mitigation is proposed for the SRWEC–NYS. These conclusions are consistent with the findings of a previous comprehensive review of the ecological impacts of marine renewable energy projects, where it was determined that there has been no evidence demonstrating that

EMF at the levels expected from marine renewable energy projects will cause an effect (negative or positive) on any species (Copping et al. 2016).

Impacts associated with potential discharges and releases and from disposal of trash and debris during operations of the SRWEC–NYS are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Onshore Facilities

Minimal impacts to benthic and shellfish resources are expected from operation of the Onshore Facilities. The Onshore Transmission Cable will be buried beneath the seabed of the ICW, between Bellport Bay and Narrow Bay. Any non-routine maintenance would occur through the HDD cable duct and would not impact the environment of the ICW.

Potential impacts to benthic and shellfish resources during operations of the Onshore Facilities are expected to be largely limited to EMF. However, the target HDD burial depth under the ICW is 5 to 75 ft (1.5 to 22.3 m); therefore, very low EMF levels are expected to be present at the ICW crossing, depending on exact burial depth at time of construction. Further, based on modeling results (Revised Appendix 4-J), EMF associated with operations will be below the detection capability of most invertebrate species. Behavioral effects and/or changes in species abundance and distributions due to EMF are therefore not expected and mitigation is not required.

As described above in the construction section, accidental discharges, releases, and disposal could indirectly cause habitat degradation, but risks will be avoided through implementation of the measures described in the SPCC Plan prepared as part of the Project EM&CP.

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during operation of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on benthic and shellfish resources. These measures are based on protocols and procedures successfully implemented for similar projects:

- The Applicant is committed to collaborative science with the commercial and recreational fishing industries prior to, during, and following construction. Fisheries monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources along the SRWEC–NYS. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of the Applicant at other wind farms in the region.

- The SRWEC–NYS will be sited to avoid and minimize impacts to sensitive habitats (*e.g.*, hard bottom habitats) to the extent practicable.
- To the extent feasible, the SRWEC–NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.
- To the extent feasible, installation of the SRWEC–NYS will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options would result in less habitat modification than dredging options. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.
- DP vessels will be used for installation of the SRWEC–NYS to the extent practicable. DP vessels minimize seafloor impacts, as compared to use of a vessel relying on multiple anchors.
- The SRWEC Landfall will be installed via HDD to avoid impacts to the nearshore zones and benthic resources. The Onshore Transmission Cable will also be installed via HDD under the ICW to avoid impacts to benthic resources.
- A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.
- The Applicant will require all construction and operation vessels to comply with applicable IMO MARPOL, federal (USCG and EPA), and NYS regulations and standards for the management, treatment, discharge, and disposal of onboard solid and liquid wastes and the prevention and control of spills and discharges. Accidental spill or release of oils or other hazardous materials will be managed offshore through an ERP/OSRP and onshore through an SPCC Plan.

4.9 FINFISH AND ESSENTIAL FISH HABITAT

This section describes the pelagic, demersal, and anadromous fish that inhabit the region and EFH identified within or proximate to the Project. Further, this section describes the potential impacts to finfish and EFH that may result from the construction and operation of the Project, along with proposed methods that the Applicant will implement to avoid, minimize, and mitigate any potential impacts.

4.9.1 Existing Conditions for Finfish and EFH

This section identifies the finfish and EFH that may be present in the inland, coastal, and marine regions crossed by the SRWEC–NYS and Onshore Transmission Cable. EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (50 CFR Part 600) as those waters (*i.e.*, aquatic areas and their associated physical, chemical, and biological properties used by fish) and substrate (*i.e.*, sediment, hard bottom, underlying structures, and associated biological communities) necessary for the spawning, feeding, or growth to maturity of managed fish species. A 0.5-mile (800-m) wide corridor from the SRWEC–NYS centerline was used for identifying species with EFH within the vicinity of the cable.

The Onshore Transmission Cable will cross the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge and will also cross Carmans River. Discussion of finfish and EFH resources within Great South Bay, Narrow Bay, and Bellport Bay are included within this analysis as these waterbodies are hydrologically connected and immediately adjacent to (and are therefore representative of) the ICW, which is a narrow portion of these larger water features. Species with EFH descriptions that include Great South Bay, or species with mapped EFH in Great South Bay that have EFH text descriptions, including shallow water environments, embayments, or estuaries, were identified as potentially having EFH along the Onshore Transmission Cable. The description of the existing conditions and assessment of potential impacts on finfish and EFH were developed by reviewing current public data sources related to finfish and EFH, including state and federal agency-published papers and databases; online data portals and mapping databases (*e.g.*, NOAA Fisheries EFH Mapper, Northeast Ocean Data Portal, Mid-Atlantic Ocean Data Portal); environmental studies; published scientific literature relating to relevant EFH studies or designations; and correspondence and consultation with federal and state agencies.

Fish species of interest in the SRWEC–NYS, ICW, and Onshore Transmission Cable are managed within a framework of overlapping international, federal, NYS, interstate, and tribal authorities. Within NYS waters, NOAA Fisheries' Highly Migratory Species Division is responsible for the management of tunas, sharks, swordfish, and billfish. Commercial and recreational fisheries in NYS waters are further managed by several regulatory agencies, including the Atlantic States Marine Fisheries Commission (ASMFC), as well as ocean management plans of various types. Additionally, unmanaged forage species such as anchovies, silversides, and sand lances may occur throughout NYS waters within the SRWEC–NYS corridor and ICW. Many of these species have not been assessed, and the abundance of most forage species varies annually based on environmental factors independent of the stock biomass (MAFMC 2017).

NYS waters along the southern side of Long Island straddle the New England and Mid-Atlantic regions and serve as the southern boundary for some New England species and the northern boundary for some

Mid-Atlantic species. The species that may be found along the SRWEC–NYS corridor reflect the transitional nature of this regional area.

The coastal waters of southern New England have diverse habitats that are defined by their temperature, salinity, pH, physical structure, biotic structure, depth, and currents. The unique combination of habitat characteristics shapes the community of fish and invertebrate species that inhabit the area. Habitat characteristics influence species composition, distribution, and predator/prey dynamics. Each habitat type supports a community of fish and invertebrate species that rely on the habitat to survive. Major benthic habitat types expected to be found the SRWEC–NYS are described in Section 4.8, Benthic and Shellfish Resources.

In the Northeast region, NOAA Fisheries and the regional management councils have identified subsets of EFH as Habitat Areas of Particular Concern (HAPC). These are habitat types and/or geographic areas identified by regional fishery management councils and NOAA Fisheries as priorities for habitat conservation, management, and research; however, the HAPC designation does not confer any specific habitat protection (MAFMC 2016). The councils identify HAPCs based on one or more of the following considerations: (1) the importance of the ecological function provided by the habitat, (2) the extent to which the habitat is sensitive to human-induced environmental degradation, (3) whether, and to what extent, development activities are, or will be, stressing the habitat type, and (4) the rarity of the habitat type (MAFMC 2016). Summer flounder is the only species with designated HAPC potentially in the vicinity of the Project (specifically in Great South Bay). The MAFMC has identified HAPC for summer flounder as "All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH" (MAFMC 2016).

Finfish off the coasts of NYS, Massachusetts, and Rhode Island include sharks and demersal and pelagic finfish assemblages (BOEM 2013b). In addition, there are important shellfish (Section 4.8, Benthic and Shellfish Resources), anadromous species, and highly migratory pelagic finfish throughout the region. Demersal species (groundfish) spend at least part of their adult life stage on or close to the ocean bottom. Many groundfish species support high-value fisheries and are sought by both commercial fishermen and recreational anglers. Pelagic fish are generally schooling fish that occupy the mid- to upper water column as juveniles and adults and are distributed from the nearshore to the continental slope and beyond. Highly migratory species are reported to be present in the near-coastal and shelf surface waters of Southern New England in the summer, taking advantage of the abundant prey in the warm surface waters. Coastal migratory pelagics include fast-swimming schooling fish that range from shore to the continental shelf edge and are sought by both recreational and commercial fishermen. These fish use the highly productive coastal waters of the more expansive Mid-Atlantic Bight during the summer months and migrate to deeper and/or distant waters during the remainder of the year (BOEM 2013b). Pelagic sharks, large coastal sharks, and small coastal sharks also occupy this region.

Five federally listed fish species may occur in the vicinity of the SRWEC–NYS corridor and ICW: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), cusk (*Brosme brosme*), giant manta ray (*Manta birostris*), and oceanic whitetip shark (*Carcharhinus longimanus*); however, no critical habitat for any of these fish species is present within the SRWEC–NYS corridor or ICW. Of these five species, only the Atlantic sturgeon and giant manta ray are common enough that they could potentially be exposed to impacts from activities associated with the SRWEC–NYS or within inland Onshore Facilities waterbodies.

Atlantic sturgeon (federally listed as Endangered, and NYS listed as a SGCN) may be present along the SRWEC–NYS corridor. Atlantic sturgeon are an anadromous species, with adults migrating from offshore and coastal marine waters into inland rivers to spawn in springtime, then back into offshore waters in the fall. In the latest status review for the species in 2007 (Atlantic Sturgeon Status Review 2007) the majority of tagged sturgeon recaptures (61 percent) happened within 3 mi (4.8 km) of shore, and the species has a documented presence along the NYS and New Jersey coastline (Dunton 2014, Dunton et al. 2015; O'Leary et al. 2014). The species is therefore likely to have a regular presence within coastal NYS waters. The New York Bight distinct population segment includes all anadromous Atlantic sturgeon that are spawned in the watersheds that drain into coastal waters from Chatham, Massachusetts to the Delaware-Maryland border on Fenwick Island, Delaware. Within this range, Atlantic sturgeon have been documented in the Hudson and Delaware Rivers as well as at the mouth of the Connecticut and Taunton Rivers and throughout Long Island Sound (77 FR 5880; Dunton et al. 2012; O'Leary et al. 2014). The SRWEC-NYS does not overlap with critical habitat of the Atlantic sturgeon (82 CFR 39160).

Giant manta ray may also have a rare presence within the SRWEC–NYS corridor as individuals were documented during NYSERDA Digital Aerial Baseline Surveys in Summer 2016 (55 individuals), Summer 2017 (28 individuals), and Summer 2018 (3 individuals) within the New York Offshore Planning Area (OPA) (Normandeau and APM 2019a, 2019b, 2019c, 2019d, 2020). The giant manta ray is federally listed as threatened throughout its range. However, the species is generally found at depths greater than 22 ft (10 m) and tagging studies (NOAA Fisheries n.d.[c]) indicate diving depths range from 656 to 1,476 ft (200 to 450 m); therefore, their presence within NYS coastal waters is expected to be minimal.

Additionally, 19 fish species are NYS listed as Threatened or Endangered, five species are NYS listed as special concern (SC), and 31 are listed as high priority species of greatest conservation need (SGCN) by the NYSDEC. Based on preferred habitats and NYS Fish Atlas distribution maps (NYSDEC n.d.[b], 2015), no

NYS listed or SC species are expected to be present within waterbodies crossed by the Project; however, eight SGCN species may be present, as detailed below in Revised Table 4.9-1.

Revised Table 4.9-1. NYS Species of Greatest Conservation Need with Potential Presence in Waterbodies Crossed by the Project

Species	Habitat Description/Documented Presence	Reference
American eel (*Anguilla rostrata*)	This catadromous species is native to all drainages of New York. Juveniles and adults can be found in benthic habitats in rivers and lakes, sometimes burrowing in soft bottom sediments, with spawning habitat in the Sargasso Sea. Species has a documented presence within Great South Bay and Carmans River.	NYSDEC n.d.[d]
Fourspine stickleback (*Apeltes quadracus*)	Species relies on NYS seagrass beds in coastal and estuarine waters and is often found in Lower Hudson-Long Island bays and watershed basins. Species has a documented presence within Great South Bay.	NYSDEC n.d.[c], n.d.[l]
Northern pipefish (*Syngnathus fuscus*)	Species occurs in Long Island Sound and the Hudson River Harbor in seagrass beds and estuaries. Also shown to seasonally migrate out of Mid-Atlantic Bight estuaries and into OCS waters during the Fall and back to estuaries in the Spring.	Lazzari and Able 1990; NYSDEC n.d.[m]
Threespine stickleback (*Gasterosteus aculeatus*)	Species occurs in lower Hudson and Long Island bay areas in brackish and freshwater habitats, but has declined in the marine waters of Long Island in recent years.	NYSDEC n.d.[o]
Winter flounder (*Pseudopleuronectes americanus*)	One of the most abundant demersal fish in Long Island Sound and the Hudson-Raritan estuary. Adults typically prefer mud, sand, cobble, rocks, or boulder substrates.	NYSDEC n.d.[p]
Dusky shark (*Carcharhinus obscurus*)	Species' range includes the northwestern Atlantic Ocean, including NYS waters. Juveniles may utilize shallow coastal estuaries and bays as nurseries.	NYSDEC n.d.[f]
Roughtail stingray (*Dasyatis centroura*)	Species' range includes the northwest Atlantic Ocean and individuals have been captured off of Long Island. The species is often found in coastal waters over sandy and muddy bottoms, and occasionally in brackish waters.	NYSDEC n.d.[f]
Sand tiger shark (*Carcharias taurus*)	Species often found in coastal and surf zone areas of the eastern US Atlantic coastline and sometimes found in shallow bays or around coral or rocky reefs. In warmer months the species has been documented in Delaware Bay.	NYSDEC n.d.[f]
Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*)	Anadromous species migrates seasonally between coastal Atlantic Ocean and inshore rivers and estuaries. Occurs seasonally during spring and fall months in New York state waters south of Long Island and migrates to deeper waters offshore during the winter months. Feeds in soft-bottom benthic habitats.	Dunton et al. 2015;, Frisk et al. 2019; NYSDEC n.d.[e]

SRWEC–NYS

Fisheries in NYS waters are primarily managed by the NYSDEC. Demersal species including black sea bass, bluefish, scup, spiny dogfish, and summer flounder are individually managed under respective NYS Quota Distribution Programs within NYS waters. Table 4.9-2 summarizes species of economic or ecological importance potentially present within SRWEC–NYS, generally characterized by their life stage and location in the water column. Silver hake, scup, skates, and summer flounder were the top finfish species landed by weight by commercial fishermen in NYS waters from the years 2008 to 2010 of all demersal species listed in Table 4.9-2(Scotti et al. 2010).

Table 4.9-2. Finfish and EFH Species Potentially Occurring along the SRWEC-NYS Corridor

Species	Life Stages with EFH proximal to Project d/		Life Stages of Other Finfish	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region a/
	SRWEC-NYS	Onshore Transmission Cable				
Demersal/Benthic						
Atlantic Cod (*Gadus morhua*) b/	Adult	-	-	X	-	Late fall to spring
Atlantic Sea Scallop (*Placopecten magellanicus*)	Egg, Larvae, Juvenile, Adult	-	-	X	X	Year-round (not common)
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)	-	-	Juvenile, Adult	-	-	May to June; September to November
Black Sea Bass (*Centropristis striata*) b/	Juvenile, Adult	Juvenile, Adult	-	X	-	April to December
Cunner (*Tautogolabrus adspersus*)	-	-	Juvenile, Adult	-	X	Year-round, hibernate in mud over winter
Fourspot Flounder (*Paralichthys oblongus*)	-	-	Juvenile, Adult	-	X	Year-round
Little Skate (*Leucoraja erinacea)*	Juvenile, Adult	Juvenile, Adult	-	X	-	Year-round(less common in summer)
Longfin Inshore Squid (*Doryteuthis pealeii*)	Egg	Egg	-	X	X	May to July
Longhorned Sculpin (*Myoxocephalus octodecemspinosus*)	-	-	Juvenile, Adult	-	-	November to May
Monkfish (*Lophius americanus)*[b]	Adult	-	-	X	-	Not common
Northern Sea Robin (*Prionotus carolinus*)	-	-	Juvenile, Adult	X	-	Spring to summer
Pollock (*Pollachius virens*)	Juvenile	Juvenile	-	X	-	Not common
Red Hake (*Urophycis chuss*) b/	Juvenile, Adult	-	-	X	X	Year-round
Sand Lance (*Ammodytes americanus*)	-	-	Egg, Larvae, Juvenile, Adult	-	X	Year-round
Scup (*Stenotomus chrysops*)	Juvenile, Adult	Juvenile, Adult	-	X	X	Spring to fall (peak in fall)
Sea Raven (*Hemitripterus americanus*)	-	-	Egg, Larvae, Juvenile, Adult	-	-	Year-Round

Species	Life Stages with EFH proximal to Project d/		Life Stages of Other Finfish	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region a/
	SRWEC-NYS	Onshore Transmission Cable				
Smoothhound Shark (*Mustelus canis*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-	-	-	April to September
Spiny Dogfish (*Squalus acanthias*)	Sub-Adult Female, Adult Male	Sub-Adult Female, Adult Male	-	X	-	Spring to fall
Spotted Hake (*Urophycis regia*)	-	-	Juvenile, Adult	-	X	Winter to spring
Striped Bass (*Morone saxatilis*)	-	-	Juvenile, Adult	X		Spring to fall
Striped Searobin (*Prionotus evolans*)	-	-	Juvenile, Adult	-	X	Spring to summer
Summer Flounder (*Paralichthys dentatus*) b/	Juvenile, Adult	Juvenile, Adult	-	X	-	Juveniles: Year-round; Adults: April to October
Tautog (*Tautoga onitis*) b/	-	-	Juvenile, Adult	X	X	April to November
White Hake (*Urophycis tenuis*)	Juvenile	-	-	X	X	Not common
Windowpane Flounder (*Scophthalmus aquosus*) b/	Juvenile, Adult	Juvenile, Adult	-	X	X	Year-round
Winter Flounder (*Pseudopleuronectes americanus)* b/	Egg, Juvenile, Adult	Egg, Juvenile, Adult	-	X	X	Eggs: December to April; Juveniles and Adults: Year-round (peak in winter and spring)
Winter Skate (*Leucoraja ocellate*)	Juvenile, Adult	Juvenile, Adult	-	X	-	Year-round (peak in winter)
Witch Flounder (*Glyptocephalus cynoglossus*) b/	Adult	-	-	X	X	Not common
Yellowtail Flounder (*Limanda ferruginea)* b/	Adult	-	-	X	X	Winter to spring
Pelagic						
Albacore Tuna (*Thunnus alalunga*)	Juvenile	-	-	X	-	Summer to fall
Alewife (*Alosa pseudoharengus*)	-	-	Juvenile, Adult	X	X	Juveniles: fall to winter; Adults: Spring
American Eel (*Anguilla rostrata*)	-	-	Juvenile, Adult	X	-	Juveniles: Spring; Adults: Year-round
American Shad (*Alosa sapidissima*)	-	-	Juvenile, Adult	X	-	Spring
Atlantic Bonito (*Sarda sarda*)	-	-	Juvenile, Adult	X	-	Summer to fall

Species	Life Stages with EFH proximal to Project d/		Life Stages of Other Finfish	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region a/
	SRWEC-NYS	Onshore Transmission Cable				
Atlantic Butterfish (*Peprilus triacanthus*)	Juvenile, Adult	-	-	X	X	Eggs/Larvae: May to September; Juveniles/Adults: June to October
Atlantic Cod c/	Egg, Larvae	-	-	X	X	Spring
Atlantic Herring c/	Larvae, Juvenile, Adult	Juvenile, Adult	-	X	X	Larvae: not common Juveniles/Adults: winter to spring
Atlantic Mackerel (*Scomber scombrus)*	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	-	X	X	Eggs/Larvae: April to June; Juveniles/Adults: late summer to fall
Atlantic Menhaden (*Brevoortia tyrannus*)	-	-	Juvenile, Adult	X	X	Summer to Fall
Atlantic silverside (*Menidia menidia*)	-	-	Juvenile, Adult	-	X	Spring to fall
Bay anchovy (*Anchoa mitchilli*)	-	-	Egg, Larvae, Juvenile, Adult	-	X	Eggs and Larvae: spring, summer, fall; Juveniles and Adults: year-round
Blueback Herring (*Alosa aestivalis*)	-	-	Juvenile, Adult	X	X	Juveniles: Fall to Winter; Adults: Spring
Bluefin Tuna (*Thunnus thynnus*)	Juvenile	-	-	X		Spring to fall
Bluefish (*Pomatomus saltatrix*)	Juvenile, Adult	Juvenile, Adult	-	X	X	June to October
Common Thresher Shark (*Alopias vulpinus*)	Neonate, Juvenile, Adult	-	-	-	-	June to December
Conger Eel (*Conger oceanicus*)	-	-	Juvenile, Adult	-	-	November to June
Dusky Shark (*Carcharhinus obscurus*)	Neonate, Juvenile, Adult	-	-	-	-	June to November
Haddock[c]	Larvae	-	-	X	X	Not common
Longfin Inshore Squid (Doryteuthis pealeii)	Juvenile	Juvenile	-	X	X	May- November
Monkfish c/	Egg, Larvae	-	-	X	X	May to September
Northern sea robin	-	-	Egg, Larvae		X	Summer to fall
Pollock c/	Larvae	-	-	X	X	Not common

Species	Life Stages with EFH proximal to Project d/		Life Stages of Other Finfish	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region a/
	SRWEC-NYS	Onshore Transmission Cable				
Red Hake c/	Egg, Larvae	-	-	X	X	Eggs: July to October; Larvae: May to November
Sandbar Shark (*Carcharhinus plumbeus*)	Neonate, Juvenile, Adult	Juvenile, Adult	-	-	-	May to September
Sand Tiger Shark (*Carcharias taurus*)	Neonate, Juvenile	Neonate, Juvenile	-	-	-	May to November
Silver hake c/	Egg, Larvae	-	-	X	-	Not common
Skipjack Tuna (*Katsuwonus pelamis*)	Juvenile, Adult	-	-	X	-	Summer to fall
Spot (*Leiostomus xanthurus*)	-	-	Juvenile, Adult	X	-	Summer to fall
Summer Flounder c/	Egg, Larvae	-	-	X	X	Eggs: October to December; Larvae: October to May
Tautog c/			Eggs, Larvae	X	X	Spring to fall
Weakfish (*Cynoscion regalis*)	-	-	Juvenile, Adult	X	X	Summer to fall
White Shark (*Carcharodon carcharias*)	Neonate, Juvenile, Adult	Neonate	-	-	-	Summer to fall
Windowpane Flounder c/	Egg, Larvae	Egg, Larvae	-	X	X	Eggs: March to October; Larvae May to December
Winter Flounder c/	Larvae	Larvae	-	X	X	February to May
Witch Flounder c/	Egg, Larvae	-	-	X	X	Not common
Yellowtail Flounder c/	Egg, Larvae	-	-	X	X	March to August
Freshwater (Carmans River)						
Black crappie (*Pomoxis nigromaculatus*)	-	-	All	X	-	Year-round
Brook Trout (*Salvelinus fontinalis*)	-	-	All	X	-	Year-round
Brown trout (*Salmo trutta*)	-	-	All	X	-	Year-round
Largemouth bass (*Micropterus salmoides*)	-	-	All	X	-	Year-round
Eastern Pirate Perch (*Aphredoderus sayanus*)	-	-	All	-	-	Year-round
White perch (*Morone americana*)	-	-	All	X	-	Year-round

Species	Life Stages with EFH proximal to Project d/		Life Stages of Other Finfish	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region a/
	SRWEC-NYS	Onshore Transmission Cable				
Yellow perch (*Perca flavescens*)	-	-	All	X	-	Year-round

NOTES:

a/ Time of year information obtained from sources listed in the reference section. When other sources unavailable, species presence based on survey information from the Block Island Wind Farm was provided from INSPIRE 2018a.

b/ This species also has life stages that are pelagic.

c/ This species also has life stages that are demersal.

d/ Includes species life stages with designated EFH within 0.5 miles of the centerline of the SRWEC-NYS and Onshore Transmission Cable corridor.

SOURCES:

Auster and Stewart 1986; Brodziak 2005; Cargnelli et al. 1999a, 1999b; Castro 2011; Chang et al. 1999; Collette and Klein-MacPhee 2002; Cross et al. 1999; Drohan et al. 2007; Dunton et al. 2015; Hart and Chute 2004; Hatfield and Cadrin 2002; INSPIRE 2018a; Jacobson 2005; Johnson 1999; Knickel 2017; Lough 2004; McBride et al. 2002; Morse et al. 1999; Morton 1989; MRG 2020a, 2020b; NOAA Fisheries 2017b, 2020g; NEFSC 2004b, 2004c, 2004d, 2006a, 2006b, 2006c, 2006d; NYSDEC. n.d.[h], n.d.[i], n.d.[j], n.d.[k], n.d.[l], n.d.[m], n.d.[n, 2008; Packer et al. 1999, 2003a, 2003b; Pereira et al. 1999; Shepherd and Packer 2006; Steihlik 2007; Steimle et al. 1999a, 1999b; Stevenson and Scott 2005; Studholme et al. 1999; Torre and Chen 2020; USFWS 1997, 2020a, 2020b, 2020c, 2020d, 2020e; VIMS 2020; Wilber 2017.

A summary of common habitat types for finfish species that could potentially occur in the SRWEC-NYS corridor is provided in Table 4.9-3. As part of the benthic habitat survey, SPI/PV stations were sampled along the SRWEC-NYS in September 2020, and the results of that survey are presented in Appendix 4-G.

Table 4.9-3. Common Habitat Types for Finfish and EFH Species Potentially Occurring in the SRWEC–NYS Corridor

Species	Habitat Type by Life Stage
Demersal/Benthic	
Atlantic Cod	Juveniles: Cobble substrates both nearshore and offshore; wide temperature ranges. Adults: On or near the bottom along rocky slopes of ledges; depths between 131 and 426 ft (40 and 130 m) but also midwater.
Atlantic Sea Scallop	Eggs: Benthic habitats in the vicinity of adult scallops. Larvae: Any hard surface, including shells, pebbles, and gravel. Juveniles/Adults: Gravel and sand.
Atlantic Sturgeon	Juveniles: In the wintertime, juveniles congregate in a deep-water habitat in estuaries. Most are found over clay, sand, and silt substrates. Adults: Primarily a marine species that is found close to shore; however, it does migrate long distances.
Black Sea Bass	Juveniles: Collected at depths of 65 to 787 ft (20 to 240 m) in channel environments. Adults: At depths of 98 to 787 ft (30 to 240 m) in shipwrecks, rocky and artificial reefs, mussel beds, and other structures along the bottom.
Cunner	All Life Stages: Coastwise fish that prefers eel grass, rock pools, or pilings at depths 13 to 23 ft (4 to 7 m).
Fourspot Flounder	All Life Stages: Benthic coastal and continental shelf waters
Little Skate	All Life Stages: Sandy/gravely bottoms at a depth range of less than 233 to 298 ft (71 to 91 m).
Longhorn Sculpin	All Life Stages: Benthic coastal waters including harbors, bays, and estuaries.

Species	Habitat Type by Life Stage
Longfin Inshore Squid	Eggs: Hard bottom habitats, submerged aquatic vegetation, sand or mud.
Monkfish	Juveniles/Adults: Bottom habitat, sand/shell mix, gravel or mud along the continental shelf, depths 82 to 656 ft (25 to 200 m).
Northern Sea Robin	Juveniles and Adults: Smooth, hard-packed bottom.
Pollock	Juveniles: Rocky bottom habitats with attached macroalgae from the intertidal zone to 600 ft (182 m)
Red Hake	Juveniles: Use of shells and substrate as shelter; found less than 393 ft (120 m) to low tide line.
Sand Lance	All Life Stages: Throughout water column over sandy substrates.
Scup	Juveniles: Nearshore in sandy, silty-sand, mud, mussel beds, and eel grass at depths of 16 to 55 ft (5 to 17 m). Adults: Soft, sandy bottom, near structures (ledges, artificial reefs, mussel beds) at a depth range less than 98 ft (30 m).
Sea Raven	All Life Stages: Prefer rocky ground; hard clay, pebbles, or sand from 300 to 630 ft (91 to 192 m) deep.
Smoothhound Shark	All Life Stages: Mostly nearshore but some have a depth range of 870 to 990 ft (145 to 165 m); prefer bottom habitats.
Spiny Dogfish	All Life Stages: Collected over sand, mud, and mud-sand transitions at depths ranging from 3 to 1,640 ft (1 to 500 m); do not travel to maximum depths in the fall.
Spotted Hake	All Life Stages: Benthic habitats over the continental shelf and within rivers and estuaries.
Striped Bass	All Life Stages: Open waters along rocky shores and sandy beaches.
Striped Searobin	All Life Stages: Coastal waters up to 328 ft (100m).
Summer Flounder	Adults: Prefer sandy habitats; captured from shoreline to 82 ft (25 m) deep.
Tautog	Juveniles and Adults: Require complex, structured habitats with a hard-bottom substrate; depths of 82 to 989 ft (25 to 30 m).
White Hake	Juveniles: Nearshore waters on fine-grained, sandy substrates in eelgrass, macroalgae, and un-vegetated habitats.
Windowpane Flounder	Juveniles and Adults: Fine, sandy sediment; nearshore less than 246 ft (75 m) deep.
Winter Flounder	Eggs: Nearshore; mud to sand or gravel. Larvae: Nearshore; fine sand to gravel. Juveniles: 59 to 88 ft (18 to 27 m) deep; mud or sand-shell. Adults: Mostly nearshore up to 98 ft (30 m) deep; mud, sand, cobble, rocks, or boulders substrate.
Winter Skate	All Life Stages: Prefer sandy or gravelly substrates; spring depths from 3 to 984 ft (1 to 300 m); fall depths from 3 to 1,312 ft (1 to 400 m).
Witch Flounder	Adults: Sub-tidal benthic habitats between 115 and 4921ft (35 to 1,500 m) with mud and muddy sand substrates.
Yellowtail Flounder	Juveniles: Sand or sand and mud; depth range of 16 to 410 ft (5 to 125 m). Adults: Sand or sand and mud; depth range of 32 to 1,181 ft (10 to 360 m).
Pelagic	
Albacore Tuna	All Life Stages: Deepwater habitats; depth range of 0 to 1,968 ft (0 to 600 m).
Alewife	Adults: Shorelines; shallower waters near estuaries.
American Eel	Larvae: Drift with Gulf Stream toward Atlantic Coast. Juveniles: Glass eels and elvers migrate to brackish waters; some remain in marine waters. Adults: Freshwater, coastal, and marine waters.

Species	Habitat Type by Life Stage
American Shad	Juveniles: Nearshore open waters. Adults: Open ocean.
Atlantic Bonito	All Life Stages: Open waters both nearshore and offshore.
Atlantic Butterfish	Eggs: Surface waters along the edge of the continental shelf to estuaries and bays. Larvae and Juveniles: Surface waters from continental shelf to bays. Adults: Surface waters from depths of 885 to 1,377 ft (270 to 420 m).
Atlantic Cod	Eggs: Bays, harbors, offshore banks; float near water surface. Larvae: Open ocean and continental shelf area.
Atlantic Herring	All Life Stages: High energy environments; gravel seafloors.
Atlantic Mackerel	Eggs: Shoreward side of the continental shelf; 32 to 1,066 ft (10 to 325 m) deep. Larvae: Offshore waters and open bays; 32 to 426 ft (10 to 130 m) deep. Juveniles: Nearshore areas; 164 to 229 ft (50 to 70 m) deep. Adults: Offshore, 32 to 1,115 ft (10 to 340 m) deep.
Atlantic Menhaden	All Life Stages: Estuaries and coastal waters.
Atlantic silverside	Juveniles and Adults: Found at great depths offshore from late fall through early spring. In the summer, they are found along the shore, within a few feet of the shoreline along sandy or gravel shores.
Bay anchovy	Eggs/Larvae: Eggs are found throughout the water column, but tend to be concentrated near the surface. Larvae move upstream to lower salinity waters in the spring and then move to more saline waters in the fall. Juveniles and Adults: shallow and moderately deep offshore waters, nearshore waters off sand beaches, open bays, and muddy coves.
Blueback Herring	Adults: High energy environments; gravel seafloors.
Bluefin Tuna	All Life Stages: Nearshore and offshore.
Bluefish	Eggs: Across continental shelf; transported further offshore. Larvae: Near edge of continental shelf; associated with surface. Juveniles: Nearshore; associated with surface. Adults: Nearshore to offshore.
Common Thresher Shark	Juveniles: Shallower waters over the continental shelf (less than 656 ft [200 m] deep) in areas of upwelling or mixing. Adults: Present near and offshore, but more common nearshore, in areas of upwelling or mixing.
Conger Eel	All Life Stages: Near the coastline to the edge of the continental shelf, 50 to 142 fathoms deep.
Dusky Shark	All Life Stages: Near and offshore.
Haddock	Eggs: Near the surface of water column. Larvae: Depths of 32 to 164 ft (10 to 50 m) with a maximum depth of 492 ft (150 m).
Longfin Inshore Squid	Juveniles/Adults: Inshore and offshore pelagic waters generally in areas with depths between 20-657 ft (6 to 200 m) and up to 1,312 ft (400m).
Monkfish	Eggs: Surface waters in areas that have depths of 49 to 3,280 ft (15 to 1,000 m). Larvae: Pelagic waters in areas that have depths of 49 to 3,280 ft (15 to 1,000 m).
Northern Sea Robin	Eggs and Larvae: Pelagic waters of the continental shelf.
Pollock	Larvae: Pelagic inshore and offshore habitats
Red Hake	Eggs: Water column within the inner shelf. Larvae: Coastal waters less than 656 ft (200 m) in depth.

Species	Habitat Type by Life Stage
Sandbar Shark	All Life Stages: Waters on continental shelves, oceanic banks, and island terraces, but also found in harbors, estuaries, at the mouths of bays and rivers, and shallow turbid water. Mostly at 65 to 213 ft (20 to 65 m) deep.
Sand Tiger Shark	All Life Stages: Nearshore ranging in depths from 6 to 626 ft (2 to 191 m); inhabit surf zone, shallow bays, and rocky reefs, and deeper areas around the OCS.
Silver hake	Eggs: Surface waters over continental shelf at depths of 164 to 492 ft (50 to 150 m). Larvae: Surface waters over the continental shelf at depths of 164 to 426 ft (50 to 130 m).
Skipjack Tuna	All Life Stages: Epipelagic, oceanic species.
Spot	All Life Stages: Coastal, nearshore, and offshore continental shelf areas.
Summer Flounder	Eggs and Larvae: Nearshore areas within eel grass beds and pilings.
Tautog	Eggs and Larvae: Coastal mid-shelf waters.
Weakfish	All Life Stages: Nearshore, shallow waters along open sandy shores and estuaries.
White Shark	All Life Stages: Nearshore and offshore, mostly spotted near the surface.
Windowpane Flounder	Eggs and Larvae: Occupy multiple areas in water column less than 229-ft (70-m) depths.
Winter Flounder	Larvae: Both nearshore and offshore.
Witch Flounder	Eggs: Deep; pelagic waters 164- to 278-ft (50- to 85-m) depths. Larvae: 0- to 820-ft (0- to 250-m) depths.
Yellowtail Flounder	Eggs: Pelagic - near-surface continental shelf waters. Larvae: Pelagic - mid-water column; movement limited to currents.
Freshwater (Carmans River)	
Black crappie	All Life Stages: lakes, ponds, sloughs, backwaters pools and streams with vegetated habitat over mud or sand; fallen trees or boulders.
Brook Trout	All Life Stages: Streams, lakes, and ponds with sand or gravel bottom and submerged aquatic vegetation.
Brown trout	All Life Stages: Lakes, rivers, and streams.
Largemouth bass	Eggs and Larvae: Firm bottom of sand, mud, or gravel. Juveniles: Aquatic weeds, tree limbs or submerged logs or stumps. Adults: Submerged aquatic vegetation in lakes ponds or pools of creeks and rivers.
Eastern Pirate Perch	All Life Stages: Low current, deep water, densely vegetated areas with woody debris; underneath banks and within root masses.
White perch	All Life Stages: Freshwater ponds and rivers near the ocean; coastal and estuarine habitats.
Yellow perch	All Life Stages: Ponds, lakes, and the pools of creeks and slow flowing rivers in clear water near vegetation; can also be found in brackish water.

SOURCES:

Auster and Stewart 1986; Brodziak 2005; Cargnelli et al. 1999a, 1999b; Castro 2011; Chang et al. 1999; Collette and Klein-MacPhee 2002; Cross et al. 1999; Drohan et al. 2007; Dunton et al. 2015; Hart and Chute 2004; Hatfield and Cadrin 2002; Jacobson 2005; Johnson 1999; Knickel 2017; Lough 2004; McBride et al. 2002; Morse et al. 1999; Morton 1989; NOAA Fisheries 2017b; NEFSC 2004b, 2004c, 2004d, 2006a, 2006b, 2006c, 2006d; NYSDEC. n.d.[h], n.d.[i], n.d.[j], n.d.[k], n.d.[l], n.d.[m], n.d.[n], 2008; Packer et al. 1999, 2003a 2003b; Pereira et al. 1999; Shepherd and Packer 2006; Steihlik 2007; Steimle et al. 1999a, 1999b; Stevenson and Scott 2005; Studholme et al. 1999; USFWS 2020a, 2020b, 2020c, 2020d, 2020e. 2020f.

Within a 0.5-mi (800-m) corridor around the SRWEC–NYS centerline, 32 species of fish and invertebrates have life stages with designated EFH, including 20 with demersal life stages and 21 with pelagic life stages (Table 4.9-3).

The finfish species within the Project area feed at multiple trophic levels. Demersal and pelagic fish species commonly consume a diverse diet of fish, shellfish, planktonic organisms, and detritus. Shellfish, worms, copepods, and other invertebrates are predominant types of prey for finfish along the SRWEC–NYS corridor. The most common vertebrate finfish prey include alewife, Atlantic menhaden, sand lance, and silver hake. Common prey of juvenile and adult finfish species that could potentially occur in the SRWEC–NYS are summarized in Table 4.9-4.

Table 4.9-4. Common Prey Species of Juvenile and Adult Finfish and EFH Species

Species	Prey Species
Demersal/Benthic	
Atlantic Cod	Benthic invertebrates
Atlantic Sea Scallop	Phytoplankton, microzooplankton, seaweed, seagrass detritus, resuspended inorganic material
Atlantic Sturgeon	Benthic invertebrates
Black Sea Bass	Invertebrates and zooplankton
Cunner	Pipefish, mummichog, and invertebrates
Fourspot Flounder	Cephalopods, crustaceans, and bony fish
Little Skate	Sand lance, alewife, herring, cunner, silversides, tomcod, and silver hake
Longhorn Sculpin	Crustaceans, fish, shrimps, crabs, amphipods, hydroids, mollusks, and squid
Longfin Squid	Planktonic organisms, crustaceans, and small fish
Monkfish	Sand lance and monkfish
Northern Searobin	Shrimp, crabs, amphipods, squid, bivalve mollusks, and segmented worms
Pollock	Herring and crustaceans
Red Hake	Crustaceans
Sand Lance	Plankton
Scup	Fish eggs and invertebrates
Sea Raven	Herring, lance, sculpins, tautog, silver hake, and both sculpin and sea-raven eggs
Smoothhound Shark	Crustaceans, particularly lobsters
Spiny Dogfish	Squid and fish
Spotted Hake	Copepods, amphipods, mysids, shrimp, crustaceans, and fish larvae
Striped Bass	Menhaden, anchovy, spot, amphipods, and sand lance
Striped Searobin	Small crustaceans, annelids, cumaceans, mollusks, fishes, and eggs
Summer Flounder	Windowpane flounder, winter flounder, northern pipefish, Atlantic menhaden, bay anchovy, red hake, silver hake, scup, Atlantic silverside, American sand lance, bluefish, weakfish, mummichog, rock crabs, squids, and shrimp
Tautog	Copepods and shellfish
White Hake	Polychaetes, shrimp, and other crustaceans
Windowpane Flounder	Invertebrates
Winter Flounder	Clams
Winter Skate	Smaller skates, eels, alewife, blueback herring, menhaden, smelt, sand lance, chub mackerel, butterfish, cunner, sculpins, silver hake, and tomcod

Species	Prey Species
Witch Flounder	Polychaetes and amphipods
Yellowtail Flounder	Invertebrates
Pelagic	
Albacore Tuna	Longfin and shortfin squid and crustaceans
Alewife	Herring, eels, sand lance, cunners, and alewife
American Eel	Small fish of many varieties, shrimp, crabs, lobsters, and smaller crustacea
American Shad	Various fish
Atlantic Bonito	Mackerels, menhaden, and sand lance
Atlantic Butterfish	Small fish, squid, and crustaceans
Atlantic Mackerel	Copepods and crustaceans
Atlantic Menhaden	Diatoms and crustaceans
Atlantic Herring	Copepods
Atlantic Silverside	Zooplankton, copepods, shrimp, amphipods, young squid, worms, insects, and algae
Bay Anchovy	Mysid shrimp, copepods, small crustaceans and mollusks, and larval fish
Blueback Herring	Zooplankton
Bluefin Tuna	Herring and eels
Bluefish	Invertebrates and crustaceans
Common Thresher Shark	Pelagic fish and squid
Conger Eel	Butterfish, herring, eels, and invertebrates
Dusky Shark	Various pelagic fish
Longfin Inshore Squid	Planktonic organisms, crustaceans, fish, and squid.
Sandbar Shark	Menhaden and crustaceans
Sand Tiger Shark	Small sharks, rays, squid, and lobster
Skipjack Tuna	Pelagic fish and invertebrates
Spot	Bristle worms, mollusks, crustaceans, and plant and animal detritus
Weakfish	Crabs, amphipods, mysid and decapod shrimps, squid, shelled mollusks, and annelid worms, menhaden, butterfish, herring, scup, anchovies, silversides, and mummichog
White Shark	Fish, rays, squid, other sharks, and marine mammals
Freshwater (Carmans River)	
Black Crappie	Planktonic crustaceans and small fish
Brook Trout	Microcrustaceans, small insects, worms, leeches, crustaceans, insects, mollusks, small fish, and amphibians
Brown Trout	Amphipods, mollusks, terrestrial insects, and fishes
Largemouth Bass	Crustaceans, insects, fish, crayfish and frogs
Eastern Pirate Perch	Live mosquito larva, amphipods, glass shrimp, meal worms, earthworms, small fish, and dragonfly and stonefly larva
White Perch	Zooplankton, minnows, crustaceans, and insects
Yellow Perch	Zooplankton, insects, crustaceans, and small fish
SOURCES: Auster and Stewart 1986; Castro 2011; Collette and Klein-MacPhee 2002; Cross et al. 1999; Drohan et al. 2007; Dunton et al. 2015; Jacobson 2005; Morton 1989; NOAA Fisheries 2017b; NEFMC 2016; NYSDEC. n.d.[h], n.d.[i], n.d.[j], n.d.[k], n.d.[l], n.d.[m], n.d.[n], 2008; Packer et al. 1999	

Species	Prey Species
Pereira et al. 1999; Shepherd and Packer 2006; Steihlik 2007; Steimle et al. 1999b; Studholme et al. 1999; USFWS 2020a, 2020b, 2020c, 2020d. 2020f.	

Onshore Facilities

The Onshore Transmission Cable will cross the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge, and will also cross Carmans River. Because data are not available for the specific location where the ICW HDD will occur, information from Great South Bay are provided. As previously described, Table 4.9-2 summarizes species of economic or ecological importance potentially present within the vicinity of the Onshore Facilities, generally characterized by their life stage, location in the water column, or presence within Carmans River.

Great South Bay is identified as the largest protected, shallow, coastal bay in NYS. Many of the commercially and ecologically important demersal, pelagic, and anadromous species expected to be present along the Onshore Transmission Cable utilize areas within the Great South Bay as important forage, nursery, and spawning habitat. Forage finfish species can be found throughout Great South Bay at different times of the year. The USFWS Northeast Coastal Areas Study (1991) identified Atlantic silverside as the most dominant finfish species year-round. The report also identified bay anchovy as a dominant forage species in the summer and sand lance in the winter (USFWS 1991). As a result of the abundance of forage species in Great South, the waterbody is utilized as forage and nursey habitat for a variety of species identified as commercially or recreationally important, including summer flounder, winter flounder, bluefish, black sea bass, cunner, striped bass, weakfish, and tautog (USFWS 1991). Striped bass are the primary commercially important anadromous species in Great South Bay, but additional, ecologically important species such as anadromous alewife utilize the bay during their seasonal spring migration up the Carmans River (NYSDEC 2008). Within the Great South Bay, 17 species of fish and invertebrates have life stages with designated EFH (Table 4.9-2).

The Carmans River is located in the Town of Brookhaven and extends approximately 10 miles from central Long Island to Bellport Bay (part of Great South Bay) (NYSDEC 2008). Carmans River is identified as one of only four major riverine systems on Long Island and contains extensive undeveloped lands. The tidal river begins approximately two miles north of Bellport Bay and is primarily within the Wertheim NWR, south of the Onshore Transmission Cable (NYSDEC 2008). The tidal portion of the river supplies important nursey habitat for striped bass and bluefish, as well as spawning and nursey habitats for alewife, Atlantic menhaden, white perch, and Atlantic silverside (NYSDEC 2008). The Onshore Transmission Cable crosses the river where it is classified as freshwater. Many freshwater fish species occur in the river, including a naturally reproducing population of brook trout, yellow perch, white perch, largemouth bass, black crappie, and unusually abundant concentrations of Eastern pirate perch (NYSDEC 2008). American eel juveniles and adults can be found in both the tidal and freshwater portions of the river (NYSDEC 2008.) The Carmans River is also identified as one of the few streams on Long Island that supports concentrations of sea-run brown trout and wild brook trout (NYSDEC 2008).

4.9.2 Potential Finfish and EFH Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to finfish and EFH and proposed mitigation.

Potential Construction Impacts and Proposed Mitigation

This section evaluates potential construction impacts to finfish and EFH expected to result from the installation of the Project and presents proposed mitigation measures, as applicable.

SRWEC–NYS

Potential direct and indirect impacts to finfish and EFH during construction of the SRWEC–NYS are anticipated to be associated with physical disturbance and sediment suspension and deposition during installation of the cable, and indirect impacts from potential discharges and releases and trash and debris, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs and are likely to be localized, with finfish and EFH resources returning to pre-existing conditions after in-water activities cease. Further, time-of-year in-water restrictions will be employed to the extent feasible to avoid or minimize direct impacts to species of concern, such as Atlantic sturgeon or winter flounder, during construction. If work is anticipated to occur outside of these time-of-year restriction periods, the Applicant will work with NYS and federal agencies to develop appropriate construction monitoring and impact minimization plans.

To the extent feasible, installation of the SRWEC–NYS will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options are expected to result in less habitat modification than dredging options. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment. To the extent feasible, the SRWEC–NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The SRWEC–NYS Landfall will be installed via HDD to avoid impacts to the nearshore zones and finfish resources.

Impacts on finfish and EFH associated with seafloor preparation, vessel anchoring, and cable installation will primarily be associated with species that have benthic/demersal early life stages (eggs and larvae) and later life stages (neonates, juveniles, and adults) that prefer the types of habitats that will be disturbed by seafloor-disturbing activities. Habitat alteration and seafloor disturbance from these activities could cause injury or mortality to benthic/demersal species, affect their habitat, and affect their spawning. Overall, direct impacts on benthic species and life stages from seafloor preparation, SRWEC–NYS installation, and vessel anchoring are expected to be minor.

Non-lethal impacts on finfish and EFH from seafloor preparation activities are expected to be short-term, as any effects will cease after seafloor preparation is completed in a given area and only a small portion of the available habitat in the area will be disturbed. Impacts on finfish and EFH species that have pelagic early and/or later life stages along the SRWEC–NYS are expected to be limited as pelagic habitats will not be directly affected by SRWEC–NYS installation. However, these species may temporarily vacate the area of disturbance. Entrainment in construction equipment is not expected to result in population-level impacts.

Boulder clearance associated with seafloor preparation may be required in the limited areas within NYS waters along the 98 ft (30 m) wide SRWEC—NYS corridor. Impacts on finfish and EFH associated with boulder clearance and related seafloor preparation activities are expected to be low. Boulders relocated during seafloor preparation will be in new locations and may be in new physical configurations in relation to other boulders. Concerning these spatial and physical attributes, the boulders are not expected to return to pre-Project conditions. However, relatively rapid (< 1 year) recolonization of these boulders is expected (Guarinello et al. 2017) and that will return these boulders to their pre-Project habitat function. Additionally, if relocation results in aggregations of boulders, these new features could serve as high-value habitat for juvenile lobster and fish that prefer structured habitat, as they may provide more complexity and opportunity for refuge than surrounding patchy habitat.

Impacts on finfish and EFH associated with the SRWEC–NYS installation and installation of cable protection are expected to result in similar impacts as those for seafloor preparation, as the cable will be installed in the same area that will be disturbed during seafloor preparation. Because of the slow speed of the cable installation equipment and limited size of the impact area, it is expected that most mobile benthic/demersal and pelagic finfish will temporarily leave the area of disturbance; however, eggs, larvae, and other sessile or slower moving species may be subject to injury or mortality. Installation of cable protection could crush benthic/demersal species, particularly eggs and larvae, but also less mobile, older life stages that do not vacate the area. Limited impacts on finfish and EFH are expected for pelagic species because they are not expected to be near the seafloor during work activities or subject to crushing or injury through placement of the cable protection.

Additionally, fish eggs and larvae (ichthyoplankton), as well as zooplankton, are expected to be entrained and killed during jet plow embedment of the SRWEC–NYS and CFE associated with sand wave leveling. These losses are expected to be very low, based on a previous assessment conducted for the South Fork Wind Farm, which found that the total estimated losses of zooplankton and ichthyoplankton from jet plow entrainment were less than 0.001 percent of the total zooplankton and ichthyoplankton abundance present in the study area, which encompassed a linearly buffered region of 9.3 m (15 km) around the South Fork Export Cable and 15.5 m (25 km) around the South Fork Wind Farm (INSPIRE Environmental 2018b).

In areas of sediment disturbance, benthic habitat recovery and benthic infaunal and epifaunal species abundances may take up to one to three years to recover to pre-impact levels, based on the results of a number of studies on benthic recovery (*e.g.*, AKRF, Inc. et al. 2012; Germano et al. 1994; Hirsch et al. 1978; Kenny and Rees 1994). Recolonization of sediments by epifaunal and infaunal species and the return of mobile fish and invertebrate species will allow this area to continue to serve as foraging habitat for finfish and EFH species. Pelagic species/life stages may be indirectly affected by the temporary reduction of benthic forage species, but these impacts are expected to be insignificant given the availability of similar habitats in the area. Other species may be attracted to the disruption and prey on dislodged benthic species or other species injured or flushed during seafloor preparation, SRWEC–NYS installation, and vessel anchoring activities. DP vessels will be used for installation of the SRWEC–NYS to the extent practicable. Use of DP vessels will minimize impacts to the seabed compared to use of a vessel relying on multiple anchors. A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.

Seafloor-disturbing activities will result in temporary increases in sediment suspension and deposition. Within the SRWEC–NYS corridor, HDD exit pits (one per HDD) will be dredged. Sediment suspension and deposition associated with construction of the SRWEC–NYS are expected to have direct impacts on sessile and slow-moving benthic species/life stages. Direct impacts on benthic/demersal finfish and EFH could include mortality, injury, or temporary displacement of the organisms living on, in, or near the seafloor. Sediment deposition on eggs or larvae may result in smothering, potentially resulting in mortality (MMS 2007). Demersal/benthic early life stages in or near the area of disturbance would be most affected. In shallow waters, TSS plumes from construction activities may occupy the majority of the water column, and mobile species/life stages may temporarily vacate the area of disturbance. However, these impacts are not expected to result in population-level effects. Pelagic species could also be affected but are expected to temporarily vacate the area to avoid the disturbance and pelagic habitat quality is expected to quickly return to pre-disturbance levels.

As described in Section 4.8.2 and Appendix 4-H, sediment transport modeling was performed using the PTM in the Surface-Water Modeling System. The models, inputs, and results are described in detail in Appendix 4-H. For the SRWEC–NYS installation, modeling results indicate that peak TSS concentrations reached 141 mg/L with concentrations exceeding 100 mg/L within 394 ft (120 m) of the SRWEC–NYS corridor centerline. The maximum deposition thickness was 0.4 in (10.1 mm) resulting in a small area (0.0015 ha) having a thickness greater than 0.4 in (10 mm) with a maximum extent of 24.6 ft (7.5 m) from the corridor. While the time to return to ambient turbidity levels will vary along the SRWEC–NYS corridor, the time to return to ambient levels was 0.3 hours after completion. The excavation of HDD pits resulted in peak TSS concentrations of 60 mg/L with concentrations exceeding 50 mg/L within 115 ft (35 m) of the sediment source. This activity resulted in a 0.17 acre (0.07 ha) area on the seafloor where the deposition thickness was greater than 0.4 in (10 mm), extending a maximum of 118 ft (36 m) from the source. The predicted time to return to ambient turbidity levels is 1.2 hours after completion. Additional information on methods and results of the sediment transport analysis are described in Appendix 4-H.

Short-term and short-range impacts on finfish and EFH could occur due to geophysical surveys, vessel noise, construction equipment noise, and/or aircraft noise. Limited research has been conducted on underwater noise from mechanical/hydro-jet plows. Generally, the noise from this equipment is expected to be masked by louder sounds from vessels. Also, as most noise generated by these pieces of equipment will be below the sediment surface and associated with the high-pressure jets, noise levels are not expected to result in injury or mortality to finfish and EFH species but may cause finfish to temporarily vacate the area. The duration of noise at a given location will be short, as the installation vessel will only be present for a short period at any given location along the cable corridor.

Short-term, localized geophysical surveys during the construction period may include the use of multi-beam echosounders (MBES), side-scan sonars (SSS), shallow penetration sub-bottom profilers, medium penetration sub-bottom profilers, and marine magnetometers. The survey equipment to be employed is not expected to result in measurable impacts on finfish and EFH.

Helicopters may be used for crew transfers between the SRWF and shore. Underwater noise associated with helicopters is generally brief as compared with the duration of audibility in the air (Richardson et al. 1995). The noise generated by aircraft will be similar to the range of noise from existing aircraft traffic in the region and is not expected to substantially affect the existing underwater noise environment.

Potential impacts of noise on finfish and EFH resources can be categorized by hearing sensitivities (Hawkins et al. 2020). The majority of fish species are relatively insensitive to sound energy at most frequencies. Species that are sensitive are primarily sensitive to frequencies between 100 and 800 Hz and are generally more sensitive to particle motion than sound pressure. The federally listed Atlantic sturgeon, though not studied directly, is believed to fall within this category based on its auditory morphology.

Vessel noise may also cause finfish to temporarily vacate the area. Vessel sound source levels have been shown to cause several different effects, the most common of which are behavioral responses, including avoidance, alteration of swimming speed and direction, and alteration of schooling behavior (Becker et al. 2013; Handegard and Tjøstheim 2005; Sarà et al. 2007; Slabbekoorn et al. 2019; Vabø et al. 2002). These studies also demonstrated that the behavioral changes generally were temporary or that fish habituated to the noises. Finfish in the vicinity of construction vessels may be affected by vessel noise, but the duration of the disturbance will occur over a very short period at any given location. Noise from vessel traffic is also expected to be similar to existing background vessel traffic noise in the area.

To mitigate against potential accidental releases, Project-related marine vessels operating during construction will be required to comply with regulatory requirements for management of onboard fluids and fuels, including prevention and control of discharges. Trained, licensed vessel operators will adhere to navigational rules and regulations, and vessels will be equipped with spill containment and cleanup materials. Additionally, the Applicant will comply with applicable international (IMO MARPOL), federal (USCG), and NYS (NYSDEC) and standards for reporting treatment and disposal of solid and liquid wastes generated during all phases of the Project.

Further, all vessels will similarly comply with USCG standards regarding ballast and bilge water management. Liquid wastes from vessels (including sewage, chemicals, solvents, and oils and greases from equipment) will be properly stored, and disposal will occur at a licensed receiving facility. Any unanticipated discharges or releases are expected to result in minimal, temporary impacts; activities are heavily regulated and unpermitted discharges are considered accidental events that are unlikely to occur. In the unlikely event that a reportable spill were to occur, the National Response Center would be notified, followed by the EPA, and USCG and NYSDEC.

Additionally, HDD at Landfall will use a drilling fluid that consists of bentonite, drilling additives, and water. A barge or jack-up vessel may also be used to assist the drilling process; handle the pipe for pull in; and help transport the drilling fluids and mud for treatment, disposal, and/or reuse. To minimize the potential risks for an inadvertent drilling fluid release, an Inadvertent Return Plan will be developed as part of the Project EM&CP and implemented during construction. Refer to Revised Exhibit E-3: Underground Construction for additional details regarding HDD installation and the use of drilling fluids.

Any active vessel operating within a marine environment has the potential to create trash and debris. However, the discharge or disposal of solid debris into waters from structures and vessels is prohibited by the USCG (MARPOL, Annex V, Pub. L. 100-220 [101 Stat. 1458]). In accordance with applicable federal, NYS, and local laws, the Applicant will implement comprehensive measures prior to and during Project construction activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. All trash and debris will be properly stored on vessels for later disposal of on land at an appropriate facility per 30 CFR 585.626(b) (9). Trash and debris returned to shore will be disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any other form of solid waste or debris in the water will be prohibited, and good housekeeping practices will be implemented to minimize trash and debris in vessel work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. With proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

For the federally listed Atlantic sturgeon, vessel strikes are an additional stressor associated with vessel traffic. The factors contributing to the risk of Atlantic sturgeon vessel strikes are currently unknown, but may be related to the size and speed of vessels, navigational clearance (*i.e.*, depth of water and draft of vessels), and the behavior of Atlantic sturgeon (*e.g.*, foraging, migrating, spawning) in areas where they co-occur with vessels (NOAA Fisheries 2018a). It is important to note that vessel strikes involving Atlantic sturgeon have only been identified as a significant concern in large coastal tributaries such as the Delaware, James, and Hudson Rivers. Studies suggest that there may be unique geographic features of the Delaware and James Rivers (*e.g.*, narrow migration corridors combined with shallow/narrow river channels) that concentrate sturgeon and vessels and increase the risk of interactions between them (Breece et al. 2016; NOAA Fisheries 2018a). In contrast, sturgeon in coastal ocean areas would not be constrained by narrow channels and would be less likely to encounter, and better able to avoid, vessels. As benthic foragers, sturgeon are often found in close association with the seafloor while feeding and would be out of range of most vessels, most of which draft less than 33 ft (10 m). Atlantic sturgeon are collected during trawl surveys in the New York Bight at water depths of 33 to 49 ft (10 to 15 m) (Dunton et al. 2010, 2012, 2015). Adult Atlantic sturgeon in the coastal ocean off Long Island typically occur deeper than 33 ft (10 m) below the surface during the winter and spring months from November through April (Erickson et al. 2011). Atlantic sturgeon are most abundant in the coastal ocean during the spring and fall months (Breece et al. 2016; Dunton et al. 2010, 2015). During the late spring and summer months, sturgeon are less abundant off the coast of Long Island when they move inshore to feed or spawn in coastal estuaries and rivers during that time (Dunton et al. 2010, 2015; Ingram et al. 2019). During the late fall and winter months, many subadult and adult Atlantic sturgeon move to deeper water (greater than 98 ft [30 m]) off the coast of NYS (Ingram et al. 2019) or migrate south along the US coast (Breece et al. 2016; Dunton et al 2010, 2015). Construction of the SRWEC–NYS will result in a minor increase in vessel traffic, but the effect is expected to be small relative to existing traffic in the region. Because large numbers of Atlantic sturgeon are not expected to be present in areas of vessel activity during much of the year and will occur at depths below the drafts of most Project vessels, the likelihood of interaction between Atlantic sturgeon and Project vessels is very low. For these reasons, vessel traffic associated with construction of the SRWEC–NYS is not expected to negatively affect Atlantic sturgeon.

During construction activities, navigational and deck lighting will be utilized from dusk to dawn on the vessels that will be installing the SRWEC–NYS. Construction lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Limiting lighting to that which is required for safety and compliance with applicable regulations is expected to minimize impacts on EFH, and direct impacts on finfish and EFH from artificial lighting are expected to be short-term because the vessels are expected to pass quickly along the SRWEC–NYS corridor during cable installation. Artificial lighting associated with SRWEC–NYS installation will be temporary and limited relative to the surrounding areas, and impacts on finfish and EFH are expected to be insignificant.

Onshore Facilities

Onshore Facilities are expected to have minimal impacts on finfish and EFH due to the majority of the facilities being on land, as well as the use of a HDD where the Onshore Transmission Cable will cross the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge as well as under Carmans River. Potential impacts to finfish and EFH resources during construction of the Onshore Facilities are anticipated to be associated with potential discharges and releases and trash and debris, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs.

The ICW HDD corridor may cross under SAV habitats and macroalgal mats that are considered HAPC for summer flounder in the ICW. As detailed in Appendix 4-G, only six SAV observations, consisting of small, solitary SAV shoots, were obtained from the ICW video footage during Summer 2020 site-specific surveys; however, the SAV was found within a dense macroalgal mat observed on the north side of the ICW HDD. The use of HDD will avoid impacts to SAV habitats and macroalgal mats. Impacts on finfish species at the Carmans River crossing is also expected to be minimal due to crossings via HDD. However, impacts could occur in the unlikely event of an inadvertent release of drilling fluid (*i.e.*, naturally occurring bentonite clay) migrate unpredictably to the surface of the seafloor through fractures, fissures, or other conduits in the underlying rock/sediments. An inadvertent release of drilling fluid along the HDD segment could cause a temporary turbidity plume; however, bentonite clay particles would be expected to settle quickly due to the natural flocculation of clay particles in seawater. Although bentonite by itself is non-toxic, it is a fine particulate material that could become entrained in the water column and transported to other locations if sufficient current velocities were present, causing turbidity and sedimentation.

Mobile species could be temporarily displaced by a turbidity plume and, depending on the thickness of materials settling on the seafloor, demersal eggs/larvae could be at risk of smothering or other injury. Demersal/benthic finfish eggs and larvae in the vicinity of a release may potentially experience short-term, direct impacts from a temporary increase in sedimentation/deposition. Eggs and larvae can be more sensitive to sediment deposition (Berry et al. 2003). They are unable to relocate from the affected areas and, therefore, would be more susceptible to impacts from an inadvertent release compared to juveniles and adults. Impacts on finfish and EFH species, if they were to occur, would be temporary and localized, and would generally be limited to individuals in the immediate vicinity of the release.

Where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with the release of drilling fluids and the Applicant will comply with applicable international (IMO MARPOL), federal (USCG) and NYS regulations and standards for treatment and disposal of solid and liquid wastes generated during all phases of the Project. Additionally, the potential for a significant loss of drilling fluid in this inshore environment is considered to be low. Given this information, impacts on summer flounder HAPC, finfish, and EFH from as a result of an inadvertent release of drilling fluid are not expected.

Additionally, although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods and installation of the Onshore Transmission Cable. An SPCC Plan will be developed, and any discharges or release will be governed by NYS regulations.

The use of HDD methodology at the ICW and at the Carmans River crossing will involve underground drilling from an onshore work area resulting in increased noise levels. It is expected that impacts from the increased noise levels will be temporary, with conditions returning to baseline level after the construction is completed.

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts.

All trash and debris returned to shore from marine vessels will be properly disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any solid waste or debris in the water will be prohibited. With proper waste management procedures, the potential for trash or debris to be inadvertently introduced is unlikely.

Vessel traffic due to the construction of Onshore Facilities is not expected to impact finfish and EFH due to the minimal portion of Onshore Facilities that cross waterbodies inhabited by finfish.

Potential Operation Impacts and Proposed Mitigation

This section evaluates potential impacts to finfish and EFH expected to result from the operation of the Project and presents proposed mitigation measures, as applicable.

SRWEC–NYS

Minimal impacts on finfish and EFH are expected from operation of the SRWEC–NYS, as it will be buried beneath the seabed where feasible and will otherwise be protected. As discussed in more detail below, seafloor disturbance during operation of the SRWEC–NYS will be limited to non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection where present. Indirect impacts may also occur from potential discharges and releases and trash and debris during non-routine maintenance, as described below. These maintenance activities and associated vessel anchoring are expected to result in similar direct impacts on finfish and EFH as those discussed for construction, although the extent of disturbance would be limited to specific areas along the SRWEC–NYS. Finally, as described below, and in Section 4.13, EMF, once the SRWEC–NYS becomes energized, the cables will produce a magnetic and induced electric field around the cables, and potential impacts to finfish and EFH resources are possible.

Cable protection (*e.g.*, concrete mattresses or rock placement) may be placed in select areas along the SRWEC–NYS. The introduction of engineered concrete mattresses or rock to areas of the seafloor can cause local disruptions to circulation, currents, and natural sediment transport patterns, though these impacts are expected to be insignificant given the miniscule surface area associated with the cable protection compared to the surrounding waters. Under normal circumstances, these segments of the SRWEC–NYS are expected to remain covered by sediment and associated cable protection (where applicable). In non-routine situations, these segments may be uncovered, and reburial might be required (for buried portions of the SRWEC–NYS). The seafloor overlaying the majority of buried SRWEC–NYS (where cable protection will not exist) is expected to return to pre-construction conditions over time and no long-term changes to sediment mobility or depositional patterns are expected.

The protection of the cable with any concrete mattresses or rock that may be required along certain areas of the SRWEC–NYS will result in the long-term conversion of soft bottom habitat to hard bottom habitat. This cable protection may have a long-term impact on finfish and EFH species associated with soft bottom habitats and a long-term beneficial impact on finfish and EFH species associated with hard bottom habitats, depending on the quality of the habitat created by the secondary cable protection, and the composition of the benthic community that colonizes that habitat.

Increases in sediment suspension and deposition during the operational phase may result from vessel anchoring and non-routine maintenance activities that require exposing portions of the SRWEC–NYS. Impacts on finfish and EFH resulting from sediment suspension and deposition during the operational phase are expected to be similar to those discussed for the construction phase, but on a more limited spatial scale.

Impacts on finfish and EFH from geophysical surveys and ship and aircraft noise during operations of the SRWEC–NYS are expected to be insignificant and similar to those discussed for the construction phase, though lesser in extent.

Once the SRWEC–NYS becomes energized, the cables will produce a magnetic and induced electric field around the cables that will decrease in strength rapidly with distance as described further in Section 4.13, EMF. The cable will be shielded and, where feasible, buried beneath the seafloor and will otherwise be protected. DC Submarine transmission cables do not directly emit electrical fields into surrounding areas but are surrounded by DC magnetic fields that can cause induced electrical fields in moving water (Gill et al. 2012). Exposure to EMF could be short- or long-term, depending on the mobility of the species.

Both tagging studies and field surveys have been conducted to determine if the presence of DC submarine cables significantly alter fish migration or the distribution of fish populations at submarine cable sites. Acoustic telemetry tagging and passive acoustic monitoring of green sturgeon and Chinook salmon in San Francisco Bay suggest that DC submarine cables are less disruptive to magnetosensitive species than the magnetic field distortions caused by large bridges spanning the San Francisco Bay (Kavet et al. 2016). An acoustic telemetry study monitoring the movements of migratory silver European eel examined the effect of a DC cable on eel movements and concluded that the cable did not act as a barrier or obstruction to migration (Westerberg and Begout-Anras 1999).

A series of biological field surveys along the Monterey Accelerated Research System cable off the coast of California tracked the presence of different marine species both before and after the installation and energization of a submarine communication/DC power cable energized to 10 kV. Over 30,000 individuals from 154 taxonomic groups were observed between 2004 and 2015 (Kuhnz et al. 2015). Based on this data, authors concluded that the Monterey Accelerated Research System cable has had little detectable impact on biological assemblages. Similarly, diver studies conducted at sites along the DC Basslink submarine cable indicated no adverse effects on fish communities, but where burial was impractical and the cable was protected with an iron shell, various fish species were observed to be associated with this vertical structure (Sherwood et al. 2016).

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SRWEC–NYS was performed and results are included in Revised Appendix 4-J. The modeling provides maximum DC magnetic and induced electric fields associated with SRWEC–NYS. The cable will be shielded and buried beneath the seafloor and does not directly emit electrical fields into surrounding areas but are surrounded by magnetic fields that can cause induced electric fields in moving water (Gill et al. 2012). Calculated DC magnetic-field deviations from the SRWEC–NYS at a minimum assumed edge-of-ROW distance of ±10 ft (3 m) from the cable centerline are less than 200 mG (and are well below the ICES and ICNIRP exposure limits). The NYSPSC limit for AC magnetic field levels at the edge of the right-of-way is 200 mG. At peak loading, the magnetic fields produced by the DC cables at the overlying seabed are projected to be well below the levels detectable by finfish, including Atlantic sturgeon. Similarly, electric fields associated with DC cables at peak loading are expected to be detectable by elasmobranchs, but based on available field studies, slightly below levels documented to elicit minor changes in the behaviors of elasmobranchs.

Based on the modeling results, the calculated magnetic field associated with the SRWEC–NYS are projected to be well below the levels detectable by finfish, including Atlantic sturgeon. Similarly, induced electric fields associated with DC cables at peak loading are expected to be detectable by elasmobranchs, but behavioral effects and/or changes in finfish and EFH species abundance and distributions due to EMF are not expected. It is not expected that finfish and EFH will be measurably affected by EMF from the cables and mitigation is not proposed

Impacts from marine discharges and releases and disposal of trash and debris during operations are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Artificial lighting during operation of the SRWEC–NYS will be associated only with vessels. Lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations. Because of the limited area that will have artificial lighting relative to the surrounding areas, and because no underwater lighting is proposed, impacts on finfish and EFH are expected to be insignificant.

Onshore Facilities

Onshore Facilities are expected to have minimal impacts on finfish and EFH due to the majority of the facilities being on land, as well as the use of a HDD where the Onshore Transmission Cable crosses the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge as well as under Carmans River. Any non-routine maintenance would occur through the HDD cable duct and would not impact the environment of these resources.

Potential impacts to finfish and EFH during operations of the Onshore Facilities are expected to be largely limited to EMF. However, as a result of the target HDD burial depth under the ICW and under Carmans River, it is not expected that finfish and EFH will be measurably affected by EMF from the Onshore Transmission Cable.

As described above in the construction section, accidental discharges, releases, and disposal could indirectly cause habitat degradation, but risks will be avoided through implementation of the measures described in the SPCC Plan prepared as part of the Project EM&CP.

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during operations of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced is unlikely.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on finfish and EFH resources. These measures are based on protocols and procedures successfully implemented for similar projects:

- The Applicant is committed to collaborative science with the commercial and recreational fishing industries prior to, during, and following construction. Fisheries monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources along the SRWEC–NYS and in the ICW. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of the Applicant at other wind farms in the region.
- To the extent feasible, installation of the SRWEC–NYS will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options would result in less habitat modification than dredging options. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.

- To the extent feasible, the SRWEC–NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.
- The SRWEC Landfall will be installed via HDD to avoid impacts to the nearshore zones and finfish resources. The Onshore Transmission Cable will also be installed via HDD under the ICW and Carmans River to avoid impacts to finfish and EFH resources.
- DP vessels will be used for installation of the SRWEC–NYS to the extent practicable. Use of DP vessels will minimize impacts to the seabed, compared to use of a vessel relying on multiple anchors.
- Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Limiting lighting to that which is required for safety and compliance with applicable regulations is expected to minimize impacts on finfish and EFH.
- Time-of-year in-water restrictions will be employed to the extent feasible to avoid or minimize direct impacts to species of concern, such as Atlantic sturgeon or winter flounder, during construction. If work is anticipated to occur outside of these time-of-year restriction periods, the Applicant will work with NYS and federal agencies to develop appropriate construction monitoring and impact minimization plans.
- The Applicant will require all construction and operational vessels to comply with applicable international (IMO MARPOL), federal (USCG and EPA), and NYS regulations and standards for the management, treatment, discharge, and disposal of onboard solid and liquid wastes and the prevention and control of spills and discharges. Accidental spill or release of oils or other hazardous materials will be managed through an SPCC Plan.

4.10 MARINE MAMMALS AND SEA TURTLES

This section provides a detailed description of the marine mammals and sea turtles that could be present along the SRWEC–NYS and within the ICW where the Onshore Transmission Cable will be installed via the ICW HDD. This section also discusses the potential impacts to marine mammals and sea turtles as a result of the construction and operation of the Project, along with the methods that the Applicant will implement to avoid, minimize, and mitigate those potential impacts.

4.10.1 Existing Conditions for Marine Mammals and Sea Turtles

The section below discusses the existing conditions for marine mammals and sea turtles.

Marine Mammals

The following information is based on current public data sources related to marine mammals. These include the NOAA Northeast Fisheries Science Center's (NEFSC's) Atlantic Marine Assessment Program for Protected Species (AMAPPS) (NOAA Fisheries 2020d; Palka et al. 2017); the Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles (Kraus et al. 2016); Remote Marine and Onshore Technology surveys for NYSERDA (Normandeau and APM 2019e); a technical report for the Rhode Island OSAMP which included analysis of Block Island Sound and nearby waters including NYS waters (Kenney and Vigness-Raposa 2010); a technical report for the NYS Offshore Wind Master Plan (NYSERDA 2017b); stranding and entanglement information from the Atlantic Marine Conservation Society (AMCS), Center for Coastal Studies (CFCS) and Coastal Research and Education Society of Long Island (CRESLI); online data portals and mapping databases (*e.g.*, marine mammal habitat density data available on the Northeast Ocean Portal [Curtice et al. 2019; Roberts et al. 2016a, 2016c, 2017b, 2018); NOAA stock assessment reports (Hayes et al. 2017, 2018, 2019, 2020) and recovery plans (*e.g.*, NOAA Fisheries 2013); the New York Bight Whale Monitoring Final Comprehensive Report per the Whale Monitoring Program (Tetra Tech and LGL 2020; NYSDEC 2021); published scientific literature relating to relevant marine mammals; correspondence and consultation with federal and state agencies; and information provided in environmental assessments conducted by BOEM for offshore waters (BOEM 2019, 2020b). Although some of these areas extend past the NYS waters jurisdictional line into offshore federal waters, some species present in these areas may also be present in the immediately adjacent and hydrologically connected NYS waters crossed by the Project.

Where available, the assessment also draws from Protected Species Observer (PSO) sightings data derived from G&G surveys undertaken within adjacent federal offshore waters (Smultea Sciences 2020). The Applicant is currently conducting nearshore surveys inclusive of the SRWEC–NYS corridor.

A description of the marine mammals that may potentially occur in the waters along the SRWEC–NYS corridor and in the ICW is provided below, followed by an evaluation of potential Project-related impacts. For the purposes of this analysis, discussion of Great South Bay was also included; sightings and potentially suitable habitat data from Great South Bay were used as representative data for the ICW where applicable as the waterbody is hydrologically connected and immediately adjacent.

Thirty species of marine mammals potentially inhabit NYS coastal and offshore waters; these include 5 mysticetes (baleen whales), 20 odontocetes (toothed whales, dolphins, and porpoise), 4 pinnipeds (earless or true seals), and 1 species of sirenian (manatee). Table 4.10-1 outlines each of the species included in these groups along with associated conservation status, relative occurrence within the SRWEC–NYS corridor and ICW, estimated population sizes, and, where applicable, identification as a strategic stock. As defined by the Marine Mammal Protection Act (MMPA), a strategic stock is "a marine mammal stock: (a) for which the level of direct human-caused mortality exceeds the potential biological removal level; (2) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the [ESA] within the foreseeable future; or (c) which is listed as a threatened or endangered species under the [ESA] or is designated as depleted under [the MMPA]" (16 USC § 1362[19]). The relative oaccurrence noted in Table 4.10-1 Table 4.10-1is based on five qualitative categories, which are defined as follows:

- **Common**. Species occurs consistently in moderate to large numbers.
- **Regular**. Species occurs in low to moderate numbers on a regular basis or seasonally.
- **Uncommon**. Species occurs in low numbers or on an irregular basis.
- **Rare**. Species records are available for some years but are limited.
- **Not expected**. Species' range includes the SRWEC-NYS corridor and/or ICW, but due to habitat preferences and distribution information, species is not expected to occur in the SRWEC-NYS corridor or ICW although records may exist for adjacent waters.

Table 4.10-1. Marine Mammals Potentially Occurring in Waters Along the SRWEC-NYS Corridor and/or the ICW

Species a/	Stock	Current Listing Status	Estimated Population b/	Relative Occurrence along Project Components	
				SRWEC-NYS	ICW and Onshore Facilities c/
Suborder Mysticeti (Baleen Whales)					
Fin Whale (*Balaenoptera physalus*)	Western North Atlantic	ESA Endangered MMPA Depleted NYS Endangered	7,418	Common	Not Expected
Humpback Whale (*Megaptera novaeagliae*)	Gulf of Maine	MMPA Depleted NYS Endangered	1,396	Common	Not Expected
North Atlantic Right Whale (*Eubalaena glacialis*)	Western North Atlantic	ESA Endangered MMPA Depleted NYS Endangered	425 f/	Common	Not Expected
Sei Whale (*Balaenoptera borealis*)	Nova Scotiad	ESA Endangered MMPA Depleted NYS Endangered	6,292	Uncommon	Not Expected
Minke Whale (*Balaenoptera acutorostrata*)	Canadian Eastern Coast	NA	24,202	Common	Not Expected
Suborder Odontoceti (Toothed Whales, Dolphins and Porpoises)					
Sperm Whale (*Physeter catodon*)	North Atlantic	ESA Endangered MMPA Depleted NYS Endangered	4,349	Uncommon	Not Expected

Species a/	Stock	Current Listing Status	Estimated Population b/	Relative Occurrence along Project Components	
				SRWEC-NYS	ICW and Onshore Facilities c/
Pygmy Sperm Whale (*Kogia breviceps*)	Western North Atlantic	NA	7,750d	Rare	Not Expected
Dwarf Sperm Whale (*Kogia sima*)	Western North Atlantic	NA		Rare	Not Expected
Cuvier's Beaked Whale (*Ziphius cavirostris*)	Western North Atlantic	NA	21,818	Rare	Not Expected
Mesoplodont Beaked Whales (*Mesoplodon spp*)	Western North Atlantic	NA	21,818e	Rare	Not Expected
Killer Whale (*Orcinus orca*)	Western North Atlantic	MMPA Depleted	Unknown	Rare	Not Expected
False Killer Whale (*Pseudorca crassidens*)	Western North Atlantic	MMPA Depleted	1,791	Rare	Not Expected
Short-finned Pilot Whale (*Globicephala macrorhynchus*)	Western North Atlantic	NA	28,924	Rare	Not Expected
Long-finned Pilot Whale (*Globicephala melas*)	Western North Atlantic	NA	39,215	Uncommon	Not Expected
Risso's Dolphin (*Grampus griseus*)	Western North Atlantic	NA	35,493	Uncommon	Not Expected
Short-beaked Common Dolphin (*Delphinus delphis*)	Western North Atlantic	NA	178,825	Common	Not Expected
Fraser's Dolphin (*Lagenodelphis hosei*)	Western North Atlantic	NA	Unknown	Rare	Not Expected
Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)	Western North Atlantic	NA	93,233	Common	Not Expected
Pantropical Spotted Dolphin (*Stenella attenuata*)	Western North Atlantic	NA	6,593	Rare	Not Expected
Striped Dolphin (*Stenella coeruleoalba*)	Western North Atlantic	NA	67,036	Rare	Not Expected
Atlantic Spotted Dolphin (*Stenella frontalis*)	Western North Atlantic	NA	39,921	Uncommon	Not Expected
Spinner Dolphin (*Stenella longirostris*)	Western North Atlantic	MMPA Depleted	4,102	Rare	Not Expected
Rough Toothed Dolphin (*Steno bredanensis*)	Western North Atlantic	NA	136	Rare	Not Expected
Common Bottlenose Dolphin (*Tursiops truncatus*)	Western North Atlantic, offshore	MMPA Depleted	62,851	Common	Not Expected
	Western North Atlantic, Northern migratory coastal	MMPA Depleted	6,639	Uncommon	Not Expected
Harbor Porpoise (*Phocoena phocoena*)	Gulf of Maine/Bay of Fundy	NA	95,543	Common	Not Expected
Suborder Pinnipedia					
Harbor Seal (*Phoca vitulina*)	Western North Atlantic	NYS SC	75,834	Regular	Rare

Species a/	Stock	Current Listing Status	Estimated Population b/	Relative Occurrence along Project Components	
				SRWEC-NYS	ICW and Onshore Facilities c/
Gray Seal (*Halichoerus grypus*)	Western North Atlantic	NA	27,131	Regular	Rare
Harp Seal (*Pagophilus groenlandicus*)	Western North Atlantic	NA	Unknown	Uncommon	Rare
Hooded Seal (*Cystophora cristata*)	Western North Atlantic	NA	Unknown	Uncommon	Rare
Order Sirenia					
Florida Manatee (*Trichechus manatus*)	Sirenian	ESA Threatened MMPA Depleted	Unknown	Rare	Not Expected

NOTES:

a/ Some marine mammal species may utilize nearby offshore habitat, but due to typical life history characteristics, they are not expected to be present nearshore (< 3 mi [4.8 km]) or in ICW waters. Species included within this table are those with either a Common, Regular, Uncommon, or Rare potential occurrence within either the SRWEC-NYS or the ICW.

b/ The latest NOAA Fisheries Stock Assessments for each species were used for estimated populations (NOAA Fisheries 2020j)

c/ Potential marine mammal presence within Onshore Facilities is expected to be limited to the ICW and the beaches where HDD landing activities will occur. Due to life history characteristics and requirements of each species included in this table, only the pinnipeds are expected to potentially occur along the designated Landfall/ICW Work Areas adjacent to the water at the location of pipeline stringing on the beach, as further described in Section 4.10.2.

d/ Although there is a Western North Atlantic stock of sei whales, no population estimates have been conducted within the last ten years, therefore population cannot be properly estimated; however, recent population estimates of the nearby Nova Scotian stock have been made, and these whales may be present within NYS waters, therefore Nova Scotia population estimates have been provided.

d/ Population estimate includes both species of Kogia combined because they are difficult to differentiate at sea, per NOAA Fisheries 2020j.

e/ It is not possible per the data available to determine the minimum population estimate of only the Mesoplodon beaked whales; therefore, the minimum population estimate is for the undifferentiated complex of beaked whales (both *Ziphius* and *Mesoplodon* spp.), per NOAA Fisheries 2020j.

f/ Population estimate is likely to change pending release of the officially updated NOAA stock assessment.

KEY:

ESA = Endangered Species Act

MMPA = Marine Mammal Protection Act

NA = species is not federally listed, is not designated as depleted under the MMPA, is not state-listed in NYS

NYS SC = NYS Species of Concern

SOURCES:

NOAA Fisheries n.d.[b], 2020j; Normandeau and APM 2019e; NYSDEC n.d.[b]; Tetra Tech and LGL 2020; Sadove and Cardinale 1993

Of the 30 marine mammal species/stocks with geographic ranges that include offshore and coastal NYS waters, 20 are expected to have only a rare or uncommon presence within the SRWEC-NYS corridor or ICW, while 10 are expected to commonly or regularly occur in within the SRWEC-NYS corridor or ICW. These latter species can be reasonably expected to reside, traverse, or routinely visit the waters along the SRWEC-NYS or the ICW based on information from NOAA stock assessment reports, and other published literature.

Five of the marine mammal species in Table 4.10-1 are ESA-listed: the humpback whale, fin whale, sei whale, sperm whale, and North Atlantic right whale. The humpback whale, which may occur year-round, was recently delisted as an endangered species. Seven species, stocks, or distinct population segments (DPS) are also protected under the ESA or Canada's Species at Risk Act, and six species are listed by NYS. The marine mammals known to occur within the waters along the SRWEC–NYS corridor and ICW are all from single stocks except for the bottlenose dolphin.

Historic seal species presence in the SRWEC–NYS corridor and/or ICW included primarily harbor and gray seals, which are still relatively abundant from late fall until late spring; however, in recent years, arctic seal species such as harp, hooded, and ringed seals, that were once extremely rare for NYS waters have also been sighted irregularly (CRESLI 2020). However, these species' typical geographic ranges and NOAA stock definitions do not overlap with the SRWEC–NYS corridor or ICW, and the species are highly unlikely to be encountered.

To support the protection of marine mammals and other marine species, designated marine protected areas and North Atlantic right whale seasonal management areas (SMA) have been identified by NOAA Fisheries throughout the US. One marine protected area overlaps with the SRWEC–NYS and Onshore Facilities: the Fire Island National Seashore. The nearby Block Island Sound North Atlantic right whale SMA does not overlap with the SRWEC–NYS or ICW. No designated critical habitats for marine mammals will be crossed by the Project.

SRWEC–NYS

Marine mammals most commonly seen in NYS waters during all seasons include harbor porpoise, bottlenose dolphin, humpback whale, fin whale, harbor seal, and gray seal, with occasional visits from sei and North Atlantic right whales (Kenney and Vigness-Raposa 2010; NYSDEC 2020d; Tetra Tech and LGL 2020).

The NYSDEC Whale Monitoring Program collects data on large whales to allow for robust estimates of spatio-temporal densities and seasonal abundance (NYSDEC 2021). The Whale Monitoring Program also identifies seasonal and inter-annual variabilities, records data on whale behavior, and identifies areas of particular importance to these species and how/when they are used (NYSDEC 2021). As a part of the Whale Monitoring Program, NYSDEC partnered with Tetra Tech Inc., Smultea Environmental Sciences, LGL Ecological Research Associates, and Aspen Helicopters, Inc. to conduct aerial line-transect surveys from March 2017 to February 2020. A total of 36 monthly aerial surveys (263 survey flights) were conducted within the New York OPA (Tetra Tech and LGL 2020) which covers a 12,668 nm^2 (16,776 mi^2, 43,449 km^2) area from the south shore of Long Island to the continental shelf break. Aerial surveys were focused around six species of large whales, including: blue whale, fin whale, humpback whale, North Atlantic right whale, sei whale, and sperm whale. Results showed that humpback whales and fin whales were the most commonly sighted species (111 sightings/279 estimated individuals and 124 sightings/207 estimated individuals, respectively) from 2017-2020. Although the full New York OPA survey area includes both deep and nearshore waters, review of spatial data (per figures within Tetra Tech and LGL 2020) illustrates that humpback and fin whales were still the most commonly sighted marine mammals within nearshore waters. Whales documented during the 2017-2020 surveys were sighted in all seasons, with the most sightings occurring during the spring and summer months.

Odontocete species could be present in the SRWEC–NYS year-round, with a peak presence during the summer months when water temperatures in this region are higher (Kenney and Vigness-Raposa 2010; Kraus et al. 2016, NYSERDA 2017b; Palka et al. 2017; Tetra Tech and LGL 2020). Seal species inhabit the cooler waters of the northeast and frequent the waters and inland areas around Long Island. Harbor and gray seals are common in NYS waters year-round, with increased presence in winter and spring. Breeding for these species occurs in open waters, predominantly between spring and fall (Temte 1994).

The only marine mammals that can regularly be found onshore in this region are seals. No pupping areas are located in NYS and the closest known pupping grounds are located in Nantucket Sound at Monomoy and Muskeget Island (NOAA Fisheries 2020e). There are about 30 known Long Island haulout sites, which are scattered around the eastern end of Long Island and along both sides of the Atlantic and Long Island Sound shores (CRESLI 2020; Kenney and Vigness-Raposa 2010). From 2019 to 2021, the AMCS has documented approximately four harbor and/or gray seal haulout sites along the Atlantic coastline of Long Island, with more scattered within Long Island Sound and off the coast of Rhode Island (AMSC 2021; R. DiGiovanni Jr., personal communication, March 9, 2021).

Seals are generally present on NYS beaches from fall until late spring (NYSDEC n.d.[b]). Within the last three years, seals have been sited along the Fire Island National Seashore, Cupsogue Beach County Park, Montauk Point State Park, and Smith Point County Park (Long Island Pulse 2017; Newsday 2020). In November 2018, an aerial survey of haulout sites around Long Island, Connecticut, and Rhode Island were conducted by the AMCS to support a UME investigation. During this survey, more than 900 harbor and gray seals were observed (AMSC 2021).

The most localized estimates of populations residing within the Long Island Sound harbors come from CRESLI, having observed nearly 16,000 harbor seals over 302 seal observation trips from 2007 through 2017 around Cupsogue Beach, during which CRESLI found the highest monthly concentrations of seals from December through April, with abrupt declines in May.

Although harbor seals are most frequently observed, gray seals also regularly occur on Long Island. Important haulouts in Long Island include: Fishers Island, Great Gull Island, Montauk Point, Gardiners Island, and Sag Harbor (Kenney and Vigness-Raposa 2010). Seals haulout on a wide variety and range of terrestrial habitats (both natural and anthropogenic) and may be encountered during landfall construction activities. Harbor and gray seals are known to move generally southward in the fall from the Bay of Fundy to north-eastern US coastal waters, particularly in southern New England waters, although they are considered to be generally non-migratory (Barlas 1999; Waring et al. 2010). Seals are most likely to be encountered at low tide, with harbor and gray seals occurring seasonally along the New Hampshire to New Jersey coastline from September to late May (Barlas 1999; DiGiovanni and Sabrosky 2010; Hoover et al. 1999; Slocum et al. 1999). Furthermore, seal watching activities on the northeast US coastline is most prevalent from December through mid-April in NYS (DiGiovanni and Sabrosky 2010).

In 2018, an unusual mortality event (UME) for harbor and gray seals was declared across Maine, New Hampshire, and Massachusetts due to an increase in mortalities from infectious disease (NOAA Fisheries n.d.[a]). The UME investigation now encompasses all seal strandings from Maine to Virginia, as seals began showing clinical signs of stranding as far south as Virginia. Investigations of harp and hooded seal strandings have also begun to show clinical signs of infectious disease, therefore these two species were added to the UME investigation that is ongoing. From July 1, 2018 to March 13, 2020, a total of 172 seals have been stranded within NYS waters (NOAA Fisheries n.d.[a]). Scientists are currently reviewing data collected to provide guidance for the UME investigation; however, it is not expected that the Project will contribute to pinniped infectious disease concerns.

Onshore Facilities

The Onshore Transmission Cable will be routed across the ICW via HDD. Some marine mammals, including the harbor porpoise, bottlenose dolphin, harbor seal, and gray seal, have been sighted in nearshore NYS waters (CRESLI 2020; Kenney and Vigness-Raposa 2010; NYSDEC 2020d) and may access the ICW via openings in the barrier island. The harbor seal, gray seal, minke whale, and bottlenose dolphin have been specifically documented within the adjacent Great South Bay (USFWS n.d.). However, the portion of the ICW that will be crossed by the Onshore Transmission Cable is a geographically small and shallow area, and most of the larger species of whale potentially occurring in NYS coastal waters such as the humpback whale, sei whale, fin whale, and North Atlantic right whale are not expected.

Sea Turtles

The following information is based on the most recent literature and studies available that focus on renewable energy sites in the Mid-Atlantic and New England regions, including the New York OPA (Kenney and Vigness-Raposa 2010; Kraus et al. 2016; Normandeau and APM 2019e; NYSDEC 2017;

NYSERDA 2017b; Palka 2010, 2011, 2012, 2013, 2014, 2015; Palka et al. 2017). Although these areas extend past NYS waters into offshore federal waters, it can be reasonably assumed that species present in these areas may also be present in the immediately adjacent and hydrologically connected NYS waters crossed by the Project.

Additional data sources utilized include data from the NOAA Fisheries ESA Section 7 mapper tool (NOAA Fisheries 2020f), Kraus et al. (2016), AMAPPS Surveys (NOAA Fisheries 2017a), NOAA Threatened and Endangered Species Directory (NOAA Fisheries n.d.[b]), the New York Bight Whale Monitoring Final Comprehensive Report (which contains sea turtle sightings data (Tetra Tech and LGL 2020), the Summary Report of the New York Bight Sea Turtle Workshop held in 2018 (Bonacci-Sullivan 2018); the most recent State of the World's Sea Turtles (SWOT 2020), Kenney and Vigness-Raposa (2010), and Cetacean and Turtle Assessment Program (CETAP) (1982).

Where available, the review also draws from multiple years of PSO sightings data derived from different contractor datasets gathered during the Applicant's G&G surveys undertaken in nearby federal offshore waters. As previously described, the Applicant recognizes that PSO sightings data are opportunistic; however, they are included herein to provide supplemental sightings data for sea turtle species and to illustrate inter-annual variation in species occurrence. Sightings data, if used with discretion, can be valuable (Baker et al. 2013; BOEM 2018) from a practical standpoint in that they inform which species may be present during operations, and previous BOEM reports have utilized PSO data for such purposes (Barkaszi and Kelly 2018). Relevant PSO data are summarized within this analysis.

Available literature and published information from the collaborative work of the USFWS and the Greater Atlantic Region Sea Turtle Program managed by NOAA Fisheries have been used to characterize expected distributions and behavior, and sea turtle geospatial sighting information was retrieved from OBIS sighting data from 1989 to 2019 (Curtice et al. 2019; Halpin et al. 2009; Roberts et al. 2016a, 2016c, 2018). Finally, strandings data have been summarized within this analysis, obtained from NOAA's Southeast Fisheries Science Center (SEFSC)'s Sea Turtle Stranding and Salvage Network Reports (NOAA Fisheries SEFSC 2020). The Salvage Network Reports for the entire US are managed by the SEFSC, and data for the last five years in NYS waters are considered herein. All sea turtle species discussed below are listed under the ESA of 1973, as amended.

There are four species of sea turtle commonly found throughout the western North Atlantic Ocean. These may occur within the waters along the SRWEC-NYS corridor and/or the ICW and include: green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), and leatherback sea turtle (*Dermochelys coriacea*). These species are federally-listed as Endangered or

Threatened under the ESA and by the NYS (NYSDEC n.d.[i]), as detailed in Table 4.10-2. Also included in Table 4.10- are current estimated population densities and predicted relative occurrence of each sea turtle species within the waters within the SRWEC-NYS corridor and/or the ICW.

Table 4.10-2. Sea Turtles Potentially Occurring Within the SRWEC-NYS and/or the ICW

Species	Current Listing Status a/	Estimated Population	Seasonal Density (no./100 km²) b/				Relative Occurance along Project Components	
			Winter	Spring	Summer	Fall	SRWEC-NYS	ICW and Onshore Facilities
Leatherback Sea Turtle (*Dermochelys coriacea*)	ESA Endangered NYS Endangered	• Northwest Atlantic DPS estimate of 31,380 adult males and females (Epperly 2017; TEWG 2007; USFWS 2013) • Between 34,000 and 36,000 estimated nesting females in the US (Sea Turtle Conservancy 2020c) • Global total average estimate of 426,000(SWOT 2020)	0.0003	0.0003	0.0003	0.0003	Common	Not Expected
Loggerhead Sea Turtle (*Caretta caretta*)	ESA Threatened NYS Threatened	• Western North Atlantic adult female population estimate of 38,334 (Richards et al. 2011) • Between 40,000 and 50,000 estimated nesting females in the US (Sea Turtle Conservancy 2020d) • Global total average estimate of 314,000 (SWOT 2020)	0.001	0.002	0.001	0.001	Common	Regular
Kemp's Ridley Sea Turtle (Lepidochelys kempii)	ESA Endangered NYS Endangered	• Between 7,000 and 9,000 estimated nesting females in the US (Sea Turtle Conservancy 2020b) • Global total average estimate of 21,000 (SWOT 2020)	0.0007	0.0007	0.00007	0.0007	Common	Regular
Green Sea Turtle (*Cheloria mydas*)	ESA Threatened NYS Threatened	• Northwest Atlantic DPS nester abundance distribution estimates 167,424 total abundance (Seminoff et al. 2015) • Between 85,000 and 90,000 estimated nesting females in the US (Sea Turtle Conservancy 2020a) • Global total average estimate of 1,002,000 (SWOT 2020)	No data				Rare	Regular

NOTES:
a/ Listing status as stated in NOAA Fisheries n.d.[b], NYSDEC n.d.[i]
b/ Sea turtle density provided by OBIS-Seamap (Curtice et al. 2019; Halpin et al. 2009; Roberts et al. 2016a, 2016c, 2018).

Species	Current Listing Status a/	Estimated Population	Seasonal Density (no./100 km²) b/				Relative Occurance along Project Components	
			Winter	Spring	Summer	Fall	SRWEC-NYS	ICW and Onshore Facilities
KEY: DPS = distinct population segment								

A fifth species, the hawksbill sea turtle (*Eretmochelys imbricata*), may occur infrequently within the region but is found predominantly in tropical waters associated with coral reef habitats and is considered extremely rare (NOAA Fisheries 2020h). Kraus et al. (2016) documented no sightings over a four-year survey period, and AMAPPS (NOAA Fisheries 2017a) documented one hawksbill turtle sighting out of 992 unique sea turtle sightings in 2017 with no other sightings in any of seven other annual surveys completed since 2010. The survey by CETAP (1982) has no mention of hawksbill species sightings. The potential for hawksbill occurrence is very low within the waters along the SRWEC-NYS corridor and ICW; therefore, no impacts are expected, and this species is not considered further in the following analysis.

USFWS and NOAA Fisheries share the responsibility for sea turtle recovery under the authority of the ESA. USFWS has jurisdiction over sea turtles when in terrestrial habitat, while NOAA Fisheries has jurisdiction over sea turtles in oceanic habitat. The ESA (16 USC §1531) prohibits the unauthorized taking, possession, sale, and transport of listed species. Under Section 7 of the ESA, federal agencies must consult with USFWS and NOAA Fisheries to ensure that any action authorized, funded, or carried out by that agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of identified critical habitat.

SRWEC-NYS

Sea turtles are likely to be present in nearshore NYS waters most often during the summer and fall seasons. As water temperatures begin to rise in late spring and early summer, the coastal waters of NYS become more suitable for sea turtles (NYSDEC n.d.[i]). Sea turtles remain local to NYS from approximately May through November and prefer the warmer waters in coastal bays and the Long Island Sound. By the end of November, they begin their migration south to warmer nesting waters (NYSDEC n.d.[i]). Leatherback, loggerhead, green, and Kemp's ridley sea turtles may all be present within the nearshore areas, where the SRWEC-NYS traverses NYS waters and makes landfall.

During NYSDEC Whale Monitoring Program aerial surveys, a total of 474 incidental sea turtle sightings (an estimated 557 individuals) were recorded (Tetra Tech and LGL 2020). A total of 50 sea turtle groups (54 individuals) were identified to species, including 16 loggerhead sea turtles, 37 leatherback sea turtles, and one Kemp's ridley sea turtle (Tetra Tech and LGL 2020). The remaining sightings (424 sightings, 503 individuals) were unidentified sea turtles (Tetra Tech and LGL 2020).

In NYS waters, leatherback turtles are often seen on the south shore of Long Island, in the New York Bight region, and within the Long Island Sound (Bonacci-Sullivan 2018; CETAP 1982; NYSDEC n.d.[i]; Tetra Tech and LGL 2020). Boaters fishing within 10 mi (16 km) of the south shore of Long Island frequently report leatherback sightings (NOAA Fisheries and USFWS 1992). During the fall of 2016, 28 leatherbacks were detected in the New York OPA (Normandeau and APM 2019e). Leatherback occurrence within the SRWEC–NYS is likely to be common.

Loggerhead sea turtles are the most frequently seen sea turtle in NYS waters (Normandeau and APM 2019e; NYSDEC n.d.[i]), although they inhabit different regions during different parts of their lives. Juveniles are frequently found in nearshore bays and Long Island Sound, while other age groups, including adults, are found up to 40 mi (64 km) off the southern Long Island coast (CETAP 1982; NYSDEC n.d.[i]). As juveniles transition to adults, habitat preferences shift to more shallow water with open ocean access (NYSDEC n.d.[i]). Loggerheads are most commonly seen in June and then decrease by October (Shoop and Kenney 1992). Loggerhead turtle occurrence within the SRWEC–NYS corridor is expected to be common.

During the warmer months of the year, juvenile and occasionally adult green sea turtles have been sighted in sea grass beds off the eastern side of Long Island (NOAA Fisheries and USFWS 1991). One sighting was reported in the New York OPA in the summer 2016 NYSERDA surveys (Normandeau and APM 2019e). Although green sea turtles have been documented in NYS waters, based on the infrequency of records, the wide distribution of these reports, and the higher likelihood of green sea turtles in NYS waters concentrating around SAV beds, green sea turtles are expected to have a rare occurrence along the SRWEC–NYS corridor.

Beginning in July, Kemp's ridley sea turtles inhabit the Long Island Sound area, and in October, the turtles begin to migrate out of the estuaries and back into pelagic environments. The Kemp's ridley turtle has a documented presence off the coast of Long Island, NY (CETAP 1982; Tetra Tech and LGL 2020; Waring et al. 2012), and is likely to be commonly encountered in the SRWEC–NYS. As noted above, Long Island Sound has been identified as potentially critical developmental habitat for immature Kemp's ridley sea turtles between two and five years of age (Morreale et al. 1992; NYSDEC n.d.[i]), although Long Island Sound is not part of the SRWEC–NYS corridor. There are no nesting habitats or designated critical habitats in the Project Area for sea turtles on the Atlantic coastline or within the ICW. Typically, sea turtle nesting occurs in the southeastern US only stretching as far north as North Carolina; however, there was a recent incidence of nesting by a Kemp's ridley sea turtle in New York (AM New York 2018). However, as there are no sea turtle nesting records north of New York, the one instance of nesting in New York is considered an extremely rare occurrence, likely the result of climate change effects (AM New York 2018).

Onshore Facilities

As previously described, the Onshore Facilities portion of the Project will include crossing the ICW. All four species of sea turtles sighted in nearshore NYS waters in the summer and fall (CETAP 1982; Kenney and Vigness-Raposa 2010; Kraus et al. 2016; NOAA Fisheries 2017a) have the ability to utilize the available coastal habitat within the ICW and adjacent Great South Bay via openings in the barrier island. Great South Bay contains a significant presence of eelgrass along the borders of Suffolk and Nassau Counties (NYSDEC 2020f), providing potential foraging opportunities for sea turtles. The loggerhead, green, and Kemp's ridley sea turtle have been documented as regularly foraging within Great South Bay's eelgrass beds (Audubon n.d.). The Kemp's ridley sea turtle has also been noted by the NYSDEC to be present, although infrequently, within Great South Bay (NYSDEC n.d.[i]). These three species are therefore expected to have a regular presence within Great South Bay, and the ICW.

Additionally, both eelgrass and widgeon grass—foraging habitat for sea turtles—have been found in the shallow bays north of Fire Island (LaFrance Bartley et al. 2018; NYSDEC 2019a; NYSDOS et al. 2020), under which the Onshore Transmission Cable will be installed via the ICW HDD between Fire Island and the mainland. However, in 2019, monitoring results at a restoration site within the Fire Island National Seashore found no eelgrass surviving from initial plantings (NPS 2020).

A nearshore drop-video survey in combination with SPI/PV sampling was conducted by the Applicant in 2020 to verify the presence of SAV beds in the ICW, north of Fire Island between Bellport Bay and Narrow Bay, as informed by spatial SAV data provided by NYSDOS (2020). As detailed in Appendix 4-G, a towed video sled was deployed along 22 transects within 328 ft (100 m) of the planned HDD corridor within the ICW. Six SAV observations were obtained from the video footage. These observations included small, solitary eelgrass shoots within a dense macroalgal mat observed on the north side of the ICW HDD. No SAV beds were documented, nor were any shoots observed on the south side (north side of Fire Island) where they had previously been reported. Therefore, minimal to no sea turtle foraging habitat is expected to be crossed by the Project.

4.10.2 Potential Marine Mammal and Sea Turtle Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to marine mammals and sea turtles and proposed mitigation.

Potential Construction Impacts and Proposed Mitigation

This section evaluates potential construction impacts to marine mammals and sea turtles expected to result from the installation of the Project and presents proposed mitigation measures, as applicable.

SRWEC-NYS

Potential direct and indirect impacts to marine mammals and sea turtles during construction of the SRWEC–NYS will be associated with physical disturbance and sediment suspension and deposition during installation of the cable and impacts from underwater construction noise and vessel traffic, and indirect impacts from potential discharges and releases, and trash and debris and vessel lighting, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs. The Applicant will provide training for personnel onboard Project vessels, including PSO monitoring and reporting procedures, to emphasize individual responsibility for marine mammal awareness and protection.

Installation of the SRWEC–NYS will include the following activities: seafloor preparation, cable installation, installation of cable protection, and anchoring vessels. To prepare the seafloor, sand waves along the corridor may be leveled via a suction hopper dredge or via CFE. Cable installation techniques include mechanical plowing, jet plowing, pre-cut mechanical plowing, pre-cut dredging, mechanical cutting, and/or CFE. These methods and anticipated maximum disturbance corridors during construction are described in detail in Revised Exhibit E-3: Underground Construction.

Equipment used for preparation of the seafloor, installing the SRWEC–NYS, and anchors being dropped from vessels could disturb marine mammals and sea turtles and could catch or constrain sea turtles, causing injury or mortality. The equipment would also be removing localized portions of the seafloor that may contain benthic prey, causing marine mammals and sea turtles to temporarily relocate for forage.

These impacts are expected to be localized and temporary. DP vessels will be used for installation of the SRWEC–NYS to the extent practicable. Use of DP vessels will minimize impacts to the seabed compared to use of a vessel relying on multiple anchors. A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources. After installation of the SRWEC–NYS, the surrounding environment is expected to return to near baseline conditions over time. Furthermore, the footprint of the SRWEC–NYS corridor will be relatively small compared to the ample surrounding open ocean habitat, and the implementation of environmental protection measures detailed below would further reduce impacts to marine mammals and sea turtles.

To the extent feasible, installation of the SRWEC–NYS will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options would result in less habitat modification than dredging options minimizing potential impacts to marine mammals and sea turtles. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Preliminary Cable Burial Feasibility Assessment. To the extent feasible, the SRWEC–NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.

Installation of the SRWEC–NYS will require the excavation of the seafloor within the SRWEC–NYS corridor. This activity is expected to result in localized increases in suspended sediments and an associated increase in turbidity levels. Increased turbidity can decrease visibility and water quality around the SRWEC–NYS. As discussed in Section 4.8.2 and Appendix 4-H, sediment transport modeling was performed using the PTM in the Surface-Water Modeling System. The models, inputs, and results are described in detail in Appendix 4-H.

For the SRWEC–NYS installation, modeling results indicated that peak TSS concentrations reached 141 mg/L with concentrations exceeding 100 mg/L within 120 m of the SRWEC–NYS corridor centerline. The maximum predicted deposition thickness was 0.4 in (10 mm) resulting in a small area (0.0037 acres [0.0015 ha]) having a thickness greater than 0.4 in (10 mm) with a maximum extent of 25 ft (7.5 m) from the SRWEC–NYS corridor. While the time to return to ambient turbidity levels will vary along the SRWEC–NYS corridor, the predicted time to return to ambient levels was 0.3 hours after installation completion. The excavation of HDD pits resulted in peak TSS concentrations of 60 mg/L with concentrations exceeding 50 mg/L within 115 ft (35 m) of the sediment source. This activity resulted in a 0.17-acre (0.07-ha) area on the seafloor where the deposition thickness was greater than 0.4 in (10 mm), extending a maximum of 118 ft (36 m) from the source. The predicted time to return to ambient turbidity levels is was 1.2 hours after completion. Additional information on methods and results of the sediment transport analysis are described in Appendix 4-H.

Considering the results of the sediment transport modeling and existing conditions along the modeled SRWEC–NYS corridor centerline, suspended sediments due to construction of the Project are expected to be a temporary disturbance to benthic habitats and are not expected to impact marine mammals or sea turtles directly. These limited temporal effects over a relatively small area are not expected to interfere with marine mammal or sea turtle foraging success. Similarly, suspended sediments are not likely to have long-term adverse impacts to prey species targeted for consumption by marine mammals or sea turtles along the SRWEC–NYS. After review of the sediment transport modeling results, only short-term, limited impacts to fish and benthic species are expected from suspended sediments; therefore, secondary effects on availability of prey to marine mammals and sea turtles are not expected.

Additionally, HDD will occur within nearshore NYS waters when the SRWEC-NYC makes landfall on Fire Island (the Landfall Work Area). In general, this will involve HDD under the seafloor and intertidal zone using a drilling rig that will be located onshore within the designated Landfall Work Area. Drilling fluid (comprised of bentonite, drilling additives, and water) will be pumped to the drilling head to stabilize the created hole. Drilling fluid will then be used to prevent a collapse of the hole and cuttings will be returned to the landfall drill site. Excavation of exit pits will occur within the surveyed corridor and outside of the Fire Island National Seashore boundary.

Accidental discharges and releases represent a risk factor to marine mammals and sea turtles because they could potentially ingest, inhale, or have their fur or baleen fouled by contaminants. Marine mammal and sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects, lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Mohr et al. 2008; Sullivan et al. 2019; Takeshida et al. 2017).

Project-related marine vessels operating during construction will be required to comply with regulatory requirements for management of onboard fluids and fuels including prevention and control of discharges. Trained, licensed vessel operators will adhere to navigational rules and regulations, and vessels will be equipped with spill containment and cleanup materials. Additionally, the Applicant will comply with applicable international (IMO MARPOL), federal (USCG), and NYS (NYSDEC) regulations and standards for reporting treatment and disposal of solid and liquid wastes generated during all phases of the Project.

All vessels will similarly comply with USCG standards regarding ballast and bilge water management. Liquid wastes from vessels (including sewage, chemicals, solvents, and oils and greases from equipment) will be properly stored, and disposal will occur at a licensed receiving facility. Any unanticipated discharges or releases are expected to result in minimal, temporary impacts; activities are heavily regulated, and unpermitted discharges are considered accidental events that are unlikely to occur. In the unlikely event that a reportable spill were to occur, the National Response Center would be notified, followed by the EPA, USCG and NYSDEC.

Additionally, HDD will use a drilling fluid that consists of bentonite, drilling additives, and water. A barge or jack-up vessel may also be used to assist the drilling process, handle the pipe for pull in, and help transport the drilling fluids and mud for treatment, disposal and/or reuse. To minimize the potential risks for an inadvertent drilling fluid release, an Inadvertent Return Plan will be developed as part of the Project EM&CP and implemented during construction.

Any active vessel operating within a marine environment has the potential to create trash and debris. Inadvertent releases of trash or debris into the water can lead to marine mammal and sea turtle injury or mortality via entanglement or the ingestion of foreign materials. Worldwide, approximately 50 percent of marine mammal species have been documented ingesting marine litter (Werner et al. 2016), and stranding data indicate potential debris-induced mortality rates of 0 to 22 percent. Mortality has been documented in cases of debris interactions as have blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014). Entanglement in trash or debris could occur if marine mammals or sea turtles are caught, ensnared, or restrained by strong, flexible, man-made materials such as fishing line or buoy lines. Most recently, on July 27, 2020, a humpback whale was reported entangled in fishing gear in the Ambrose Channel, New York; a four-day effort was launched to safely untangle the whale (NOAA Fisheries 2020i). The North Atlantic right whale is also known to be particularly sensitive to entanglement.

In accordance with applicable federal, NYS, and local laws, the Applicant will implement comprehensive measures prior to and during Project construction activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. Trash and debris will be contained on vessels and offloaded at port or construction staging areas. All other trash and debris returned to shore will be disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any other form of solid waste or debris in the water will be prohibited, and good housekeeping practices will be implemented to minimize trash and debris in vessel work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. With proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Project vessels with anchor lines, cables, and other equipment have the potential to entangle marine mammals and sea turtles when left unattended in the water. The lines that will be deployed in support of the Project will be associated with the cable plow/ trencher towing cables and umbilicals. While most scientific studies have focused on entanglement as bycatch (Henry et al. 2020), recent work explored the entanglement risk to marine wildlife from offshore renewable developments (Benjamins et al. 2012; Harnois et al. 2015; Reeves et al. 2013). The key parameters used in these risk assessments were tension characteristics, line swept volume ratio, and line curvature of moorings. These assessments concluded that taut configurations present a low risk of entanglement to all marine mammals. Similarly, plow cables/umbilicals will be under constant tension, and in this taut condition represent a far reduced entanglement risk. If a line or cable is lost, it would then present a higher risk to species entanglement, with the potential for a prolonged impact on the individual, including mortality. However, the Applicant will utilize BMPs to prevent loss of lines and cables, and no entanglement is expected due to vessel activities during construction.

Artificial lighting during installation of the SRWEC–NYS will be associated with navigational and deck lighting on vessels from dusk to dawn. Artificial lighting on Project-related vessels will be transient relative to the surrounding unlit areas, moving along the cable corridor during the linear installation of the SRWEC–NYS. Lighting is not expected to impact marine mammals. Reaction of sea turtles to this artificial light is dependent on species-specific and environmental factors that are impossible to predict but may include either attraction (including in response to attracted prey) or avoidance of a lit area. Because of the low anticipated density of sea turtles in the area, the limited area associated with the artificial lighting used on Project vessels relative to the surrounding unlit areas, and the short-term and transient nature of construction vessel activities, the impacts to sea turtles are likely to be temporary and minimal.

Noise

Noise will be generated during the construction phase of the SRWEC–NYS by cable-laying vessels and potential dredging during cable-laying. Although marine mammals and sea turtles are expected to perceive underwater noise from construction and installation of the SRWEC–NYS, impacts are not expected to be biologically significant to populations. Individuals may temporarily vacate the area; however, they are expected to return once activity ceases. Additionally, the likelihood of impact to marine mammals decreases with the lower expected presence in nearshore waters compared to offshore waters, with the possible exception of some dolphins, porpoises, and seals, and a few of the larger whale species, which may be found closer to shore on a seasonal basis. Pinnipeds that may be present along the SRWEC–NYS, could also be susceptible to in-air noise disturbance at haulout sites and in-air thresholds have been established by NOAA Fisheries. However, activities at this location are anticipated to produce relatively low levels of in-air noise.

Impulsive Sound – Geophysical Surveys

Short-term, localized high-resolution geophysical (HRG) surveys during the construction period and upon completion of post lay cutting operations via a post burial survey will be carried out using a combination of MBES or SSS to confirm the mean seafloor and a cable detection system to confirm the target cable burial depth. Site-specific verification has been conducted of all geophysical equipment sound source deployed within the SRWEC–NYS corridor that operate within the functional hearing range of marine mammals and sea turtles. The survey equipment to be employed will be equivalent to the equipment utilized during the HRG survey campaigns associated with SRWEC–NYS conducted in 2019 and 2020 (CSA Ocean Sciences Inc. 2020). Hearing injury effects are not expected and any behavioral effects are anticipated to be direct and short-term.

Non-impulsive Sound – Vessel Noise

The dominant underwater noise source from a DP cable-laying vessel is due to cavitation on the propeller blades of the thrusters (Leggat et al. 1981). SRWEC–NYS installation will occur over a relatively short timeframe (five to seven months), along a narrow swath of ocean bottom (*i.e.*, the maximum disturbance corridor width of 98 ft [30 m]) where relatively few marine mammals would be potentially exposed to noise.

Studies on behavioral responses to anthropogenic noise clearly indicate that animals will show variable responses to noise dependent on species, behavioral contexts, and the distance of animals to the sound source (Ellison et al. 2012). Responses to vessel disturbances can include behaviors such as changes to their vocalizations, surface time, swimming speed, swimming angle or direction, respiration rates, dive times, feeding behavior, and social interactions (Au and Green 2000). In a study by Matthews et al. (2020), vessel noise was found to overlap with breeding vocalizations of harbor seals, where seals in Glacier Bay National Park and Preserve, Alaska did not adjust source levels or acoustic parameters of vocalizations to sufficiently compensate for acoustic tasking. For every 1 dB increase in ambient noise, harbor seal signals decreased by 0.84 dB, indicating a reduction in communication that could potentially impact breeding success (Matthews et al. 2020).

Noise from Project-related vessel traffic during SRWEC–NYS construction is expected to be transient and comparable to existing levels of local and transiting traffic within the region, with potential disruptions in behavior, communication, or temporary displacement expected to be short-term. It is likely that underwater noise from existing anthropogenic activities occurring in the region would be indiscernible from incremental Project-related underwater noise from vessel traffic, making it uncertain if marine mammals would experience behavioral impacts as a result of Project activities or the level of potential existing habituation to vessel noise.

Vessel Traffic

Construction of the SRWEC–NYS will require various vessel types including tugs, barges, and work and transport vessels. DP vessels will generally be used for cable burial activities. Construction activities may also require the support of several smaller, faster moving vessels (*e.g.*, crew transfer vessel [CTV] and other small supply vessels). If anchoring (or a pull ahead anchor) is necessary during cable installation, it will occur within the survey corridor. There will be a minimum safety perimeter around

SRWEC–NYS installation vessels; this temporary restricted area will consist of a maximum 500-yard (457-m) safety zone.

As the SRWEC–NYS installation activities approach the landfall, fewer large whale species (*i.e.*, those at highest risk of strike) are expected in the area because of the shallower waters and generally less preferred habitat. However, vessel strikes are a growing issue for some marine mammal species and have the potential to result in population-level effects when it comes to particularly vulnerable species such as the North Atlantic right whale (Conn and Silber 2013; Laist et al. 2001; Van der Hoop et al. 2013; Van Waerebeek et al. 2007). Variables that contribute to the likelihood of a collision include vessel speed, vessel size and type, visibility, and barriers to vessel detection by an animal (*e.g.*, acoustic masking, heavy traffic, biologically focused activity).

Research indicates that most vessel collisions that result in serious injury or death to marine mammals occur at speeds of more than 14 knots (25.9 kilometers per hour [km/h]) and with vessels that are 262 ft (80 m) or greater in size, while there is a statistically significant reduction in lethal ship strike at speeds below 10 knots (18.5 km/h) (Conn and Silber 2013; Laist et al. 2001; Van der Hoop et al. 2013). Vanderlaan and Taggart (2007) found the probability of a strike resulting in mortality increased from 20 to 100 percent at speeds between 9 and 20 knots (16.7 and 37 km/h), and that lethality from ship strike increased from 35 to 40 percent at 10 knots (18.5 km/h), 45 to 60 percent at 12 knots (22.2 km/h), and 60 to 80 percent at 14 knots (25.9 km/h). Studies showed that increased vessel speed also increased the hydrodynamic draw of vessels, which could result in North Atlantic right whales being pulled toward vessels, making them more vulnerable to collisions (Conn and Silber 2013). Conn and Silber's (2013) assessment of lethality of ship strikes showed an 80 to 90 percent decrease in total ship strike mortality risk level during vessel speed restriction periods. Two well-documented North Atlantic right whale vessel strikes incurred by marine mammal research vessels demonstrated that even with expert observation, ideal sea state conditions, and vigilant crews, the speed of the vessel combined with sometimes cryptic behavior of the whale presents a clear risk for vessel strikes (Wiley et al. 2016).

The species most prone to vessel strikes include the six large whale species (North Atlantic right whale, humpback whale, fin whale, sei whale, minke whale, and sperm whale). The sperm and sei whale, as shown in Table 4.10-1, are expected to have an uncommon presence within NYS waters, however the other four large whale species are expected to have a common occurrence within the SRWEC–NYS corridor. Incidences of strike for these large whales tend to be higher than other marine mammals due to their large size, slower movements and travel (for some species), breathing patterns (longer surface respiration bouts), lengthy surface rest periods, long-range movements during migrations, and feeding patterns which for most of the large whales (excluding right whales) typically include periods of surface lunges (Dolman et al. 2006; Henry et al. 2020). North Atlantic right whales are particularly prone to ship strike and disturbance for these reasons (Cates et al. 2019). Smaller dolphin and seal species (such as harbor porpoise, Atlantic white-sided dolphins, short-beaked common dolphin, bottlenose dolphins, long-finned pilot whales, harbor seals, and gray seals) are less vulnerable to ship strike due to their agility in the water, generally smaller surface area, and ability for rapid avoidance responses (Glass et al. 2009; Laist et al. 2001; van der Hoop et al. 2015).

The 2018 US Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Hayes et al. 2019) accounts that between 2012 and 2016, there were a reported annual average of 2.6 vessel collisions with humpback whales in the Gulf of Maine stock, 1.4 collisions with fin whales in the Western North Atlantic stock, and 1.0 collision with minke whales in the Canadian East Coast stock. Furthermore, in the latest US Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Hayes et al. 2020), between 2013 and 2017, the average annual vessel collisions of the same species and stocks were greater for the humpback whale (4.4 per year), less for the fin whale (0.8 per year), and the same for minke whales (0.8 and 1.0, respectively) (Hayes et al. 2020). In 2016, a high number of humpback whale mortalities on the Atlantic coast prompted NOAA Fisheries' Office of Protected Resources to declare an UME (NOAA Fisheries 2020a). As of the last reported online update of September 8, 2020, 133 humpback whales were found dead along the Atlantic coast from Maine to Florida including 29 off NYS (Henry et al. 2020; NOAA Fisheries 2020a). Of the carcasses that have been examined, approximately 50 percent have shown signs of human interaction, either vessel strike or entanglement.

Similarly, since January 2017 a high number of minke whale mortalities along the Atlantic coast prompted NOAA Fisheries to declare an UME (NOAA Fisheries 2020b). NOAA Fisheries, in collaboration with the Working Group on Marine Mammal UMEs, is working to review collected data on these events, as findings were not consistent across on whales examined. From January 2017 through September 8, 2020, a total of 15 minke whales were stranded off the coast of NYS, with an overall total of 97 strandings from South Carolina to Maine (NOAA Fisheries 2020b).

The level of humpback whale vessel strikes between 2016 and 2017 on the Atlantic coast was more than six times the 16-year average (NOAA Fisheries 2019). On July 17, 2020, a humpback whale was recorded stranded approximately 6 mi (9.7 km) offshore near Montauk, and on July 18, 2020, another humpback whale was reported to the NYS Stranding Hotline by a vessel conducting G&G surveys for the Project (AMCS 2020). The whale washed ashore that evening at Smith Point County Park. The whale recorded offshore was not autopsied; however, the beached whale's head tissues were examined and were found to be consistent with vessel strike trauma (AMCS 2020).

For North Atlantic right whales, vessel strikes pose a significant risk to the species' survival, mainly due to their small population size, behavioral characteristics, and habitat preferences that make them highly susceptible to vessel encounters. Vessel strike is consistently one of the most common causes of North Atlantic right whale mortality annually (Cates et al. 2019; Hayes et al. 2019). The Ship Strike Reduction Rule (50 CFR § 224.105) mandates a speed restriction of 10 knots (18.5 km/h) or less between November 1 and April 30 in the right whale SMAs. These restrictions apply to all vessels greater than or equal to 65 ft (20 m) in overall length and subject to US jurisdiction as well as all other vessels greater than or equal to 65 ft (20 m) in overall length entering or departing a port or place subject to US jurisdiction. Marine mammal ship strike deaths in US waters averaged about one per year during the 18 years documented before the 2008 rule. Since the 2008 rule, ship strike deaths have averaged less than half of that (*i.e.*, 0.47 deaths per year).

In 2017, there were five confirmed ship strike mortalities of North Atlantic right whales (four in Canadian waters and one in US waters off Nantucket, MA), likely caused by right whales occurring in areas without speed restrictions and increased vessel traffic (Henry et al. 2020; NOAA Fisheries 2019). In June 2017, NOAA initiated an UME for North Atlantic right whale (NOAA Fisheries 2020c) due to the significant increase in mortalities. According to NOAA Fisheries' Office of Protected Resources (last updated online on July 28, 2020), from 2017 to 2020, a total of 31 dead stranded North Atlantic right whales (21 in Canada and 10 in the US) have been confirmed, with the leading cause of death being human interaction from entanglements and/or vessel strikes (NOAA Fisheries 2020c). Ten other non-stranded North Atlantic right whales were documented as seriously injured during this timeframe, bringing the estimated total up to 41 individual whales, assuming a "serious injury" is likely to lead to eventual mortality (NOAA Fisheries 2020c). The most recent of these losses include a calf that was identified off Elberon, NJ in June 2020 with evidence of sharp and blunt force trauma (*i.e.*, suggestive of vessel strike) (NOAA Fisheries 2020c). The endangered status and small population size of the North Atlantic right whale stock make it more vulnerable to impacts from the perspective of negative population consequences, particularly those resulting in possible injury or mortality, which could result in removal of an individual from an already critically small stock. Potential impacts to this population would likely be more severe than other marine mammal species, so it is considered more carefully in this assessment.

In addition to the potential for strike, the presence of vessel traffic can be a stressor to marine mammals. Many studies have documented short-term responses in whales to both vessel noise and vessel traffic (Baker et al. 1983; Magalhães et al. 2002; Watkins et al. 1986). It is, however, often difficult to determine whether a marine mammal exhibiting a behavioral change is responding to the physical presence of the vessel itself, to the noise generated by the vessel, or to some unknown and potentially unrelated but synchronous factor, such as proximity to “conspecifics” (other animals of the same species), predators (killer whales), vocalizations from other animals, normal shifts in behavioral states, or other human-induced factors. Reactions also may vary depending on context, such as the reproductive (*e.g.*, presence of calves) or behavioral (*e.g.*, foraging versus migrating) states of the individual.

Potential risk to marine mammals from strike and disturbance from Project-related vessels will be greatest during the construction phase as it will require a temporary increase in vessel traffic. However, as stated in Revised Exhibit E-6: Effect on Transportation, construction of the SRWEC–NYS is not expected to have measurable impacts on existing marine transportation and navigation. Additionally, ship speeds for vessels greater than 65 ft (20 m) may be limited during certain time periods or in certain areas. The Applicant will comply with NOAA Fisheries regulations and relevant state regulations for North Atlantic right whales and will adhere to vessel strike avoidance measures as advised. The Applicant will comply with NOAA Fisheries speed restrictions within the Mid-Atlantic US SMA for North Atlantic right whales of 10 knots (18.5 km/h) or less for vessels 65 ft (20 m) or greater during the period of November 1 through April 30. The Applicant will further comply with the 10 knot (<18.5 km/h) speed restrictions in any dynamic management area (DMA; adaptive ‘Slow Zones’) or will implement alternative mitigation measures pursuant to engagement with BOEM and NOAA Fisheries. To monitor the number of vessels and traffic patterns for analysis and compliance with vessel speed requirements, all vessels associated with the Project will be required to have operational automatic identification system (AIS). Furthermore, the increased monitoring for marine mammals that will be part of this Project will provide a beneficial effect by supporting adaptive mitigation and increasing situational awareness for vessels in the area. The Applicant will provide training for personnel onboard Project vessels, including PSO monitoring and reporting procedures, to emphasize individual responsibility for marine mammal awareness and protection. The Applicant will continue to support external initiatives to further mitigate marine traffic impacts and currently is a supporter of the Whale Alert system.

Impingement of sea turtles in towed equipment and between vessels and equipment has been identified in seismic surveys (Nelms et al. 2016) and excavation operations (Dickerson et al. 2004); however, direct sea turtle impacts such as these are rare, particularly if the proper environmental protection measures are followed. The primary threat to sea turtles from temporary increased vessel traffic is the potential for accidental vessel strikes, which could result in injury or mortality. Sea turtles swimming or feeding at or near the surface of the water can be vulnerable to vessel strikes as propeller and collision injuries to sea turtles from boats or vessels are not uncommon (NOAA Fisheries and USFWS 1991). It is estimated that approximately 50 to 500 turtle mortalities per year in US waters result from collisions with vessels (Plotkin et al. 1995). Vessel strikes happen when either the turtle or the vessel fails to detect the other in time to avoid the collision. Variables that contribute to the likelihood of a collision include vessel speed, vessel size and type, and visibility.

Sea turtles can detect approaching vessels, likely by sight rather than by sound, and seem to react more to slower moving vessels (2.2 knots [4.1 km/h)] than to faster vessels (5.9 knots [10.9 km/h] or greater) (Hazel et al. 2009). When a vessel is large, traveling at a high speed, or located in a geographic bottleneck such as a narrow strait, mortality is more likely (Laist et al. 2001; Work et al. 2010). However, sea turtles may not be able to avoid all collisions, and injury or mortality from vessels is possible. Sea turtle vessel strike injuries that result in mortality are often difficult to determine due to the nature of post-mortem injuries on recovered carcasses.

Some sea turtle species and life stages are more susceptible to vessel strikes than others. For example, loggerhead juveniles found in coastal waters during foraging and resting are highly susceptible to vessel strikes. Similarly, smaller turtles such as the Kemp's ridley green, and loggerhead turtles may be difficult to see in the water (Kenney and Vigness-Raposa 2010). Kemp's ridley turtles and loggerhead turtles are additionally impacted more heavily by drops in water temperature resulting in cold-stunning where their diving capacities constrain them to a floating, motionless presence at the water's surface (Burke et al. 1991; Hochscheid et al. 2010), which makes them more prone to vessel strikes. Leatherback sea turtles residing near coastal areas in the summer season have a higher susceptibility to vessel strikes due to the increased number of transiting vessels during that time of year (Kenney and Vigness-Raposa 2010).

In the unlikely event a vessel strike was to occur to a marine mammal or sea turtle during Project construction that resulted in mortality or serious injury impacts to the most vulnerable ESA-listed species (*e.g.*, the North Atlantic right whale), the impact could result in population-level effects. Impacts to less vulnerable ESA-listed species and non-ESA listed species from vessel strikes may result in injury or mortality of individuals; however, mortality impacts are expected to be less likely to result in population-level effects. With the implementation of environmental protection measures, the risk of vessel strikes to marine mammals during the construction period will be reduced.

Onshore Facilities

After landfall on Fire Island, the Onshore Transmission Cable will cross the ICW via an HDD to a paved parking lot within the Shirley Marina County Park along East Concourse Drive. During construction of the Onshore Facilities, only seals hauled out on land could experience direct, short-term impacts from land disturbance and in-air noise, as all activities (such as HDD) will be conducted from land with no in-water work expected within the ICW where marine mammals and sea turtles could occur.

As previously described, HDD will occur onshore within the designated Landfall and ICW Work Areas. Prior to Landfall HDD activities, pipeline stringing will need to occur, which will consist of laying the pipeline on the beach, adjacent to the water. The Landfall HDD activity is expected to occur in fall and winter, during which time pipeline will be sitting on the beach. This activity, and the noise it produces, may disturb or displace hauled-out seals; however, the disturbance/displacement will be temporary, with beach habitat returning to pre-existing conditions once construction is complete. Furthermore, the nearest AMCS-documented haulout site is located approximately 6 to 7 miles from where HDD activities will occur.

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of HDD for the ICW HDD and trenchless installation and duct bank installation methods, and installation of the Onshore Transmission Cable. An SPCC Plan will be developed as part of the Project EM&CP and any discharges or releases will be governed by NYS regulations. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts; as activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. All trash and debris returned to shore from offshore vessels will be properly disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any solid waste or debris in the water will be prohibited. All crew supporting the Project will undergo marine debris awareness training, and such training will include use of the data and educational resources available through the NOAA Fisheries Marine Debris Program. The Applicant will advise all construction vessels to comply with USCG, EPA and NYSDEC regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. With proper waste management procedures, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Potential Operational Impacts and Proposed Mitigation

This section evaluates potential impacts to marine mammals and sea turtles expected to result from the operation of the Project.

SRWEC-NYS

Minimal impacts on marine mammals and sea turtles are expected from operation of the SRWEC-NYS, as it will be buried beneath the seabed where feasible and will otherwise be protected. Seafloor disturbance during operation of the SRWEC-NYS will be limited to non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection where present. Noise may be introduced into the marine environment during operation of the SRWEC-NYS as a result of G&G surveys and support vessels and aircraft. Indirect impacts may also occur from potential discharges and releases and trash and debris during non-routine maintenance, as described below. These maintenance activities are expected to result in similar direct impacts to marine mammals and sea turtles as those discussed for construction, although the extent of disturbance would be limited to specific areas along the SRWEC-NYS corridor. Finally, as described below and in more detail in Section 4.13, EMF, once the SRWEC-NYS becomes energized, the cables will produce a magnetic and induced electric field around the cables.

The SRWEC-NYS is not expected to significantly alter the existing habitat as it will be buried beneath the seafloor, except for locations where cable protection is deemed necessary by a Cable Burial Risk Assessment. Routine maintenance activities for the SRWEC-NYS are not expected to result in seafloor disturbances. The only potential impact on marine mammals and sea turtles could be the temporary disruption of benthic prey species for marine mammals and sea turtles foraging on or near the seafloor during non-routine maintenance. Maintenance of the SRWEC-NYS involving uncovering and reburial of the cable is considered a non-routine event and is not expected to occur with any regularity. Given the relatively small area of seafloor that would be disturbed if non-routine of the SRWEC-NYS is required, and the availability of prey within the broader region around the SRWEC-NYS, impacts on marine mammals and sea turtles from seafloor disturbances during operations are considered short-term and minimal.

Increases in sediment suspension and deposition during operation of the SRWEC-NYS will primarily result from vessel anchoring and any maintenance activities that will require exposing the SRWEC-NYS. These activities are expected to be non-routine events and are not expected to occur with any regularity. Sediment suspension and deposition impacts resulting in increased turbidity during operation of the SRWEC-NYS are, therefore, anticipated to be similar to those described for the SRWEC-NYS construction phase (*i.e.*, temporary and minimal) but less frequent and at a smaller scale.

Short-term, localized impacts from HRG surveys during operation may occur from the use of MBES, SSS, and shallow penetration sub-bottom profilers, medium penetration sub-bottom profilers, and marine magnetometers. Seafloor surveys will occur one year after commissioning, two to three years after commissioning, and five to eight years after commissioning with the frequency thereafter dependent on the findings of initial surveys. Site-specific verification has been conducted of all geophysical equipment sound source deployed within the SRWEC–NYS corridor that operate within the functional hearing range of marine mammals and sea turtles. The survey equipment to be employed will be equivalent to the equipment utilized during the HRG survey campaigns associated with the SRWEC–NYS conducted in 2019 and 2020 (CSA Ocean Sciences Inc. 2020).

Throughout the operational life of the SRWEC–NYS, the Applicant expects to use a variety of vessels to support operation, including service operating vessels (SOVs) with deployable work boats (daughter craft), CTVs, jack-up vessels, and cable laying vessels. Project vessels will undergo routine maintenance trips between potential ports in NYS and Rhode Island and the SRWEC–NYS. Impacts from vessel use during operation would be similar to those described for construction. Marine mammal and sea turtle individuals may experience direct, short-term, reversible behavioral disruptions due to the incremental and transient contribution of operation vessels.

Once the SRWEC–NYS becomes energized, the cables will produce a magnetic and induced electric field around the cables as described further in Section 4.13, EMF. Research suggests that marine species may be more likely to detect and react to magnetic fields from DC cables than AC cables. Studies of marine mammal strandings data from the United Kingdom and US found that, in some cases, strandings were correlated with geomagnetic disturbances that occurred one to two days before the stranding. From these results, it was hypothesized that these cetaceans possess a sensitivity to the Earth's geomagnetic field and may at times rely on geomagnetic cues for navigation. However, other studies of strandings show no evidence of geomagnetic navigation.

Normandeau et al. (2011) suggest that bottlenose dolphins are most likely to encounter DC cables in the coastal environment and hypothetical modeling based on evidence of geomagnetic stranding suggests that the bottlenose dolphin (and other dolphins and porpoises) might be able to detect the field emitted by a DC cable (assuming cable field not influenced by the geomagnetic field) multiple meters above the cable..

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SRWEC–NYS was performed and results are included in Revised Appendix 4-J. The modeling provides maximum magnetic and induced electric fields associated with SRWEC–NYS for the DC cable. The cable will be shielded and buried beneath the seafloor will not directly emit electric fields into surrounding areas but are surrounded by magnetic fields that can induce electric fields in moving water (Gill et al. 2012). Based on the modeling results, the calculated DC magnetic field associated with the SRWEC–NYS does not exceed limit for AC magnetic fields set by the NYSPSC (and is well below the ICNIRP exposure limit). Because marine mammals and sea turtles likely to occur within the SRWEC–NYS corridor would be transiting and foraging and would not spend significant time on the seafloor in proximity to the proposed cables, direct impacts from magnetic fields is unlikely. Any detection of the magnetic fields around cables are not expected to cause changes in swimming direction or otherwise alter migration routes, and thus are not anticipated to result in adverse effects to either individual or population health. Indirect effects on marine mammals and sea turtles from alterations in prey due to EMF are also unlikely. It is not expected that marine mammals and sea turtles will be measurably affected by EMF from the SRWEC–NYS and mitigation is not required.

Impacts to marine mammals and sea turtles from marine discharges and releases and trash and debris during operations are expected to be similar to, but of lesser likelihood than during construction as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Potential impacts to marine mammals and sea turtles during operations may also include direct effects from vessel strike and behavioral disturbance. The Applicant expects to use a variety of vessels to support operation of the SRWEC–NYS, including SOVs with deployable work boats (daughter craft), CTVs, cable laying vessels, and support barges. The type and number of vessels will vary over the operational lifetime of the Project (*e.g.*, 25- to 35-years). There will be fewer vessels used for routine maintenance trips than for construction or non-routine maintenance, but they will occur over a longer period considering the operational life of the Project. To monitor the number of vessels and traffic patterns for analysis and compliance with vessel speed requirements, all vessels associated with the Project will be required to have operational AIS. All vessels will operate in accordance with applicable rules and regulations for maritime operation within US and NYS waters. Additionally, the Project will adhere to vessel speed restrictions as appropriate in accordance with NOAA requirements.

Vessel activity during operations will be localized and short-term. Similar to impacts described for the construction phase, in the unlikely event a strike was to occur during Project operations that resulted in mortality or serious injury impacts to the most vulnerable ESA-listed species (*e.g.*, North Atlantic right whale), the impact could result in population-level effects. Impacts to less vulnerable ESA-listed species and non-ESA listed species from vessel strikes may result in injury or mortality of individuals; however, mortality impacts are expected to be less likely to result in population-level effects.

In addition to the potential for strike, the presence of vessel traffic during operations can be a stressor to marine mammals and sea turtles but potential behavioral effects are not likely to be discernable from potential effects experienced during existing regional vessel traffic conditions.

Cable protection measures such as concrete mattresses may be placed in select areas along the SRWEC–NYS, providing sporadic hard-bottom habitat along the SRWEC–NYS corridor. As a secondary solution if burial can't occur, potentially placing rock overtop the cable to cover and protect it.

Cable protection measures would not extend into the water column and would be comparable to existing areas where boulders or other hard-bottom habitat are present. Species composition along the cable corridor is, therefore, not expected to change substantially following construction. Furthermore, the introduction of hard-bottom habitat along the corridor may have a beneficial long-term impact on benthic species (*i.e.*, marine mammal and sea turtle prey).

Onshore Facilities

Onshore Facilities are expected to have minimal impacts on due to the majority of the facilities being on land, as well as the use of a HDD where the Onshore Transmission Cable crosses the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge. Any non-routine maintenance would occur through the HDD cable duct and would not impact the environment of the ICW.

The ICW is part of a partially enclosed waterbody with less natural flushing or tidal activity as compared with the open ocean and nearshore waters previously described. Additionally, where the Onshore Transmission Cable will cross, the water depths are less than 10 ft (3 m; NOAA n.d.[a]). Marine mammals and sea turtles are more likely to be utilizing the nearby larger portions of Great South Bay as opposed to the more trafficked and narrowed crossing of the Smith Point Bridge where the Onshore Transmission Cable will be installed.

Potential impacts to marine mammals and sea turtles during operations of the Onshore Facilities are expected to be largely limited to EMF. Even then, marine mammals and sea turtles are most likely to encounter EMF effects from the subsea cable if feeding on benthic organisms or resting on the seafloor above the cable. However, the target HDD burial depth under the ICW is 5 to 75 ft (1.5 to 22.3 m); therefore, only very low or no EMF levels are expected to be detected at the crossing, depending on exact burial depth at time of construction. Additionally, marine mammals are more likely to be utilizing the nearby larger portions of Great South Bay as opposed to the more trafficked and narrowed crossing of the Smith Point Bridge where the subsea cables will be installed.

As described above in the construction section, accidental discharges, releases, and disposal could indirectly cause habitat degradation, but risks will be avoided through implementation of the measures described in the SPCC Plan prepared as part of the Project EM&CP.

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during operation of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on marine mammal and sea turtle resources. These measures are based on protocols and procedures successfully implemented for similar projects:

- The Applicant will develop protected species mitigation and monitoring plan which will incorporate findings from the underwater acoustic assessment; supplement existing data gaps; allow for evaluation of changes caused by coastal infrastructure within the context of larger regional shifts in species distributions; and describe the avoidance, minimization, mitigation, and monitoring measures and approaches taken by the Applicant. Long-term regional monitoring efforts will also be discussed in this plan.
- The Applicant will work further with BOEM and NOAA Fisheries to refine an adaptive mitigation and monitoring approach that optimizes flexibility, while appropriately mitigating potential impacts to marine mammals and sea turtles, including the following proposed environmental protection measures:
    - The Applicant will comply with the current NOAA Fisheries speed restrictions at the time of Project activities.
    - The Applicant will require operational AIS on all vessels associated with the construction and operation of the Project, pursuant to USCG and AIS carriage requirements. AIS will be used to monitor the number of vessels and traffic patterns for analysis and compliance with vessel speed requirements.
    - The Applicant will adhere to vessel strike avoidance measures as required by BOEM and NOAA Fisheries.
    - To the extent feasible, the SRWEC-NYS will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed

conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.

- Plow cables/umbilicals will be under constant tension, and in this taut condition, are not expected to represent an entanglement risk.
- The Applicant will require all construction and operation vessels to comply with NYS regulations and standards for the management, treatment, discharge, and disposal of onboard solid and liquid wastes and the prevention and control of spills and discharges.
- The Applicant will provide training for personnel onboard Project vessels, including PSO monitoring and reporting procedures, to emphasize individual responsibility for marine mammal and sea turtle awareness and protection.
- Per BOEM lease conditions, the Applicant will require all crew supporting the Project will undergo marine debris awareness training, and such training will include use of the data and educational resources available through the NOAA Fisheries Marine Debris Program.
- The Applicant will advise all construction and operation vessels to comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials.
- The Applicant will continue to support external initiatives to further mitigate marine traffic impacts and currently is a supporter of the Whale Alert system.
- The Applicant will participate in a developer co-funded initiative to support continuation of New England Aquarium Right Whale Aerial Surveys in 2020/21.
- The Applicant completed a comprehensive underwater acoustic assessment to include modeling in support of evaluation of potential impacts due to noise generated during construction of the Project. The assessment followed NOAA Fisheries' Greater Atlantic Regional Fisheries Office tool for assessing the potential effects to ESA-listed fish and sea turtles exposed to elevated levels of underwater sound from pile driving. Potential zones of influence described in this assessment will be reflected in the proposed mitigation measures in the mitigation and monitoring plan.
- Additionally, the Project will implement the following mitigation measures, pursuant to ongoing dialogue with BOEM and NOAA Fisheries. Each of these methods and tools has been successfully applied by the Applicant, and/or its affiliates in support of geophysical

surveys and/or the construction and operation of offshore wind projects across the globe. A protected species mitigation and monitoring plan will describe these measures and will be included within the Incidental Harassment Authorization (IHA):

- Exclusion and monitoring zones
- Ramp-up/soft-start procedures
- Shutdown procedures (if technically feasible)
- Qualified and NOAA Fisheries-approved PSOs
- Noise attenuation technologies
- Passive Acoustic Monitoring systems (fixed and mobile)
- Reduced visibility monitoring tools/technologies (*e.g.*, night vision, infrared and/or thermal cameras)
- Adaptive vessel speed reductions
- Utilization of software to share visual and acoustic detection data between platforms in real time.

4.11 MARINE PHYSICAL AND CHEMICAL CHARACTERISTICS

This section describes the existing conditions and assesses potential effects from the construction and operation of the Project, as they relate to marine physical and chemical conditions. The description of the existing conditions and assessment of potential impacts to marine physical and chemical characteristics were developed by reviewing current public and unpublished data sources, including NYS and federal agency-published papers and databases, online data portals and mapping databases (*e.g.*, NOAA, NCEI, OceanReports Tool, and Marine Cadastre Mapper), environmental studies, published scientific literature; and the Project's G&G surveys. G&G surveys of the SRWEC-NYS were conducted in 2019 and 2020, and the finalized results of these surveys will be completed in 2021. Results of sediment chemistry analysis conducted on samples obtained along the SRWEC–NYS corridor will be available in 2021.

Onshore conditions are described in Section 4.5, Topography, Geology, Soils, and Groundwater.

4.11.1 Existing Marine Physical and Chemical Characteristics

This section describes the existing marine physical and chemical characteristics along the SRWEC-NYS as well as within the ICW crossed by the Onshore Transmission Cable. The following parameters are specifically discussed: physical characteristics – bathymetry, circulation, water column stratification and sediment transport; chemical characteristics – water quality.

Physical Characteristics

Bathymetry

The SRWEC–NYS is located entirely within the North Atlantic Ocean. The bathymetry in the area of the SRWEC–NYS corridor is based site-specific geophysical surveys conducted in 2020. Water depths, referenced as the mean lower low water, along the SRWEC–NYS corridor range from approximately 0 to 95 ft (0 to 29 m) within NYS waters.

Ocean Circulation

Circulation patterns are influenced by winds, tides, differences in water density (dependent on temperature and salinity), and geomorphology (*i.e.*, bathymetry and land masses). Surface currents are affected by winds, and in response, can drive opposing currents lower in the water column. Differences in water densities and temperatures can drive local or regional circulation patterns that can span the whole water column. The Coriolis effect, tides, and larger movements of water, such as the Gulf Stream, drive a net transport of water.

Regionally, currents from the Rhode Island Sound meet outflow from Block Island Sound off Montauk Point and flow southwest along the southern shoreline of Long Island. Although current flow south of Long Island follows an overall southwestern direction, nearshore currents flow towards the east (RI CRMC 2010).

Waves generally move across this region from the south with average wave heights ranging from 3.3 to 9.8 ft (1 to 3 m). The highest storm waves are up to 30 ft (9 m) high. Under normal conditions, wave action results in little disturbance to bottom waters or sediments. Semi-diurnal (*i.e.*, twice daily) tides flood in from the southeast, with an average tidal amplitude of 3.2 ft (1.0 m) (RI CRMC 2010). The closest NOAA tide station near the SRWEC–NYS is on the north shore of Long Island in Montauk, New York (Station 8510560). The mean diurnal tidal range measured at this station in 2019 was 2.4 ft (0.76 m) (NOAA 2020c).

Relative sea level rise will also influence the waves, water level, and currents throughout the Project's 25 to 35-year life. Based on data trends recorded at NOAA Station 8510560 in Montauk, New York, relative sea level rise is anticipated to increase by 0.1 in/year (3.4 mm/year). Over the course of the Project's life cycle, relative sea level rise is anticipated to increase between 3.3 to 4.6 in (84.25 to 117.95 mm).

An assessment of ocean currents and statistics were generated based on modeled hindcast reanalysis of inputs for the years 2001 to 2010 from the Hybrid Coordinate Ocean Model (HYCOM) 1/12-degree global simulation, which references assimilated data through the Navy Coupled Ocean Data Assimilation, developed by the US Naval Research Laboratory (Halliwell 2004). The 2001 to 2010 period was chosen as the most recent 10 years of reanalysis data for HYCOM currents and its matching wind Climate Forecast System Reanalysis (CFSR) that is available. Average surface current speeds were consistently found to be about 8 inches per second (in/s; 20 centimeters per second [cm/s]) throughout the year, with the strongest currents of 20 in/s (50 cm/s; as the 95th percentile) in late fall and early spring,

Surface and bottom currents were evaluated using results from the HYCOM model for flood and ebb events on April 6 to 7, 2016. These specific dates were chosen because they occur during a month of high river discharge season and during spring tide. The year 2016 was the most recent timeframe that provided a clean water level signature without the presence of notable non-tidal residuals. The bottom and surface current speeds along the SRWEC–NYS corridor range from approximately 0 to 1.3 feet per second (ft/s) (0.3 to 0.4 meter per second [m/s]), with nearshore current speeds approaching 1.6 ft/s (0.5 m/s). During a flood tide, the bottom and surface currents along the SRWEC–NYS corridor are oriented to the north and northwest, whereas during an ebb tide, the bottom and surface currents in the SRWEC–NYS corridor are oriented to the south and southeast.

Tides along the SRWEC–NYS corridor are semi-diurnal (*i.e.*, occurring twice daily) and advance from the southeast; this tidal pattern results in approximately two high tides and two low tides per day. The closest NOAA tide station near the SRWEC–NYS corridor is on the north shore of Long Island in Montauk, New York (Station 8510560). The mean diurnal tidal range measured at this station in 2019 was 2.5 ft (0.8 m) (NOAA 2020c).

The Applicant will deploy up to four near-shore floating bottom-mounted acoustic doppler current profiler (ADCP) one year prior to construction and during construction in the nearshore area at the cable landfall and along the cable corridor to support cable installation activities. Bottom-mounted ADCPs collect current measurements, including direction and velocity through the water column by sending pulses through the water column at varying frequencies. This data may be stored internally and transferred upon equipment recovery or, for real-time monitoring, the data may be transmitted via telemetry to a satellite gateway to an onshore server using a transmission buoy. The number and locations of ADCPs will be determined as the cable corridor is further defined and in coordination with stakeholders.

Water Column Stratification

In general, the heating of water and increased salinity during late summer and early fall results in a stratified water column that is subject to mixing in the fall from upwelling bottom waters and storm action. The temperature and salinity trends described below contribute to this seasonal stratification.

Surface water temperatures in the Atlantic Ocean fluctuate up to 59 degrees Fahrenheit (°F) (15 degrees Celsius [°C]) seasonally and, bottom waters at the site have a smaller seasonal variation of approximately 41°F (5°C). Water temperatures are highest in July and August when the water column becomes stratified; surface water temperatures are near 68°F (20°C), with bottom waters about 50°F (10°C). Stratification can create physical conditions that reduce interactions and mixing between surface waters and the remainder of the water column (RI CRMC 2010). During the winter, average surface water temperatures range from approximately 39 to 41°F (4 to 5°C).

Within the Great South Bay, the most proximate source of ocean temperature data to the SRWEC–NYS corridor is NOAA's meteorological buoy (Station 44069). However, it is important to note that this buoy has not collected any data in January or March and has only collected data in February in one year to date; as such, winter temperatures are underrepresented in that dataset. Based on data collected from that buoy from 2016 through 2019 (NOAA 2020a), daily mean surface temperatures range from 32.4°F to 29.3°F (0.2°C to 29.3°C) in Great South Bay. Peak surface temperatures occur in July and August, a period when the water column becomes stratified and the mean surface temperature is approximately 79.2°F (26.2°C). The lowest surface temperatures occur in December and February, when the monthly mean temperatures are approximately 40.6°F (4.8°C) and 36.1°F (2.3°C), respectively.

Surface water salinity decreases in the spring with freshwater inflows from ice melts and spring rains and increases with temperature in the summer, with highest surface water salinities in the fall and winter. Bottom water salinities are higher than surface water salinities throughout the year, setting up for stratification as described above. Highest salinities within the area (approximately 33 Practical Salinity Scale) are found in bottom waters at the southern end of the Rhode Island Sound and decrease closer to land.

Sediment Transport

Sediment types along the SRWEC-NYS corridor range from predominantly mixed sand to sandy mud and sand. Boulder fields, predominantly of medium density, and sand waves have been identified in the nearshore area along the SRWEC-NYS corridor (Appendix 4-G). Investigations of the framework geology in the area demonstrated the importance of inner-shelf, shoreface-attached sand ridges that contribute sediment to the shoreface through erosion of the glacial outwash sands and gravels exposed by ravinement processes (Schwab et al. 2000, 2014). The location of the shoreface-attached sand ridges is correlated with areas of island stability in the central and western portion of Fire Island. Sand borrow areas have been identified by USACE in these central and western areas offshore of Fire Island and at the Moriches Inlet offshore location. Installation of the SRWEC-NYS will avoid these areas so that sand resources can be accessed for future beach renourishment projects along Long Island.

At the eastern end of Fire Island, where shoreface-attached sand ridges are absent, the shoreline exhibits net erosion and landward retreat (Schwab 2014). Repeated seafloor mapping and modeling of flow patterns and sediment transport along the inner-shelf sand ridges demonstrated that, while the short-term mixed current flow directions drive both offshore and onshore sediment transport, the dominance of strong winds and currents from the east results in a net westward migration of the sand ridges and a shoreward flux of sediment in troughs between sand ridges (Schwab 2014; USGS 2017).

Chemical Characteristics

Water Quality

The New York–New Jersey Bight (defined as the shallow waters between Long Island to the north and east, and the New Jersey coast to the south and west) will be crossed by the SRWEC–NYS. The SRWEC–NYS makes landfall on Fire Island via HDD and transitions to the Onshore Transmission Cable which will then cross the ICW via the ICW HDD. For the purposes of the water quality analysis, data from Great South Bay was used as representative data for the ICW where applicable, as the bay has greater availability of water quality data and is connected and immediately adjacent to the ICW. In addition, the Onshore Transmission Cable will include a crossing of the Carmans River, which for the purposes of the water quality analysis are included as they are hydrologically connected to the Great South Bay.

Dissolved Oxygen

Dissolved Oxygen (DO) refers to the concentration of oxygen present in water. The source of the DO may be atmospheric or from photosynthesis in aquatic plants, including phytoplankton. Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic material, such as that produced during large algal blooms, is decomposed by microorganisms (Long Island Commission for Aquifer Protection [LICAP] 2016).

DO along the Long Island South Shore in 2007, as described in the Coordinated Water Resources Monitoring Strategy (USGS 2016), was deemed by NOAA to be “moderately high,” averaging 8.5 mg/L. The New York–New Jersey Bight has experienced more frequent periods of hypoxia in recent years despite upgrades to wastewater treatment plants and other industrial discharges (NYS 2019).

These hypoxic periods have lowered benthic biodiversity and reduced growth in commercially harvested species (Committee on Natural Resources and Environment 2010).

In the summers of 2016 and 2017, DO concentrations south of the hamlet of Sayville, New York, were reported to be low for sustained periods of time (The Nature Conservancy 2018). Furthermore, three portions of Great South Bay are listed under the most recent NYS 303(d) impaired waterbodies list (NYSDEC 2016) for low DO and nitrogen content. Great South Bay has been listed as impaired since 2010 and total maximum daily loads (TMDL) are in place for these pollutants. Low DO in the bay is attributed to increasingly high levels of nitrogen in the water. Due to the water quality concerns in Great South Bay, DO, salinity, conductivity, nutrients, coliform bacteria, suspended solids, chlorophyll *a*, phytoplankton, temperature, and light transmittance are being monitored up to four times annually by the Suffolk County Department of Health Services (SCDHS) (SCDHS 2019a ; Suffolk County Government 2020a). From 2015 through 2019, results from water samples collected at the nearest water monitoring station (Station 90100, approximately 106 ft [32.3 m] from the Onshore Transmission Cable [see Revised Figure 4.5.3]) showed DO concentrations ranging from 3.9 to 12.3 mg/L (SCDHS 2019a, 2019b).

Carmans River is not listed as a 303(d) impaired waterbody (NYSDEC 2016). However, the SCDHS also conducts regular water quality monitoring within the river for DO, metals, bacteria, organics, and other nutrients. Within Carmans River, the nearest monitoring station to the Onshore Facilities is Station 95052, located approximately 1.3 mi (1.2 nm, 2.0 km) from the Onshore Transmission Cable (SCDHS 2019a, 2019b) (see Revised Figure 4.5.3). DO concentrations from samples collected between 2015 and 2019 at this station ranged from 1.3 to 11 mg/L (SCDHS 2019a, 2019b).

Chlorophyll a

Chlorophyll *a* is a pigment used by photosynthetic organisms such as phytoplankton to convert solar energy into organic matter. Concentrations of chlorophyll *a* can be used to determine the amount of phytoplankton present. Excess phytoplankton in an area can lead to overproduction of algae and degraded water quality; therefore, chlorophyll *a* is often used as a metric of water quality health.

In the offshore waters of NYS, the OceanReports Tool (NOAA n.d.[a]) provides chlorophyll *a* concentrations obtained from monthly water surface readings over a 10-year period (2007–2016) by the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC). The OceanReports Tool reports higher chlorophyll *a* concentrations in NYS coastal waters than in offshore waters. Chlorophyll *a* concentrations in micrograms per liter (µ/L), obtained from monthly water surface readings over a 10-year period (2007-2016) by the NASA GSFC. Chlorophyll *a* ranged from 2.69 µg/L in June to 5.38 µg/L in November (Marine Cadastre 2019). The National Coastal Assessment (NCA) has determined that in northeastern US waters, chlorophyll *a* concentrations less than 5 µg/L are considered "good," 5 to 20 µg/L concentrations are considered "fair," and concentrations greater than 20 µg/L are considered "poor" (EPA 2012). Therefore, chlorophyll *a* concentrations within the waters surrounding the SRWEC–NYS per the results provided by Marine Cadastre (2019) can be considered "good" with the exception of readings in September and November, which reached "fair" concentration levels.

Chlorophyll *a* levels within Great South Bay, which is crossed by the Onshore Facilities north of the Project Landfall location, have generally been described as "typical" when compared to other nearby estuaries, with higher concentrations often found from late June through October (NPS 2005). Chlorophyll *a* data collected from the nearest SCDHS Great South Bay water quality monitoring station (90100) between 2015 and 2019 displayed a wide range of detections. Data showed total chlorophyll a concentrations from 0.6 to 44.9 µg/L, with an average of 5.2 µg/L (SCDHS 2019a, 2019b). Similarly, for the same period of time, chlorophyll *a* levels at the Carmans River (also crossed by the Onshore Facilities) water quality monitoring station (905052) ranged from 0.53 to 53.15 µg/L; however, the average concentration, 18.9 µg/L, was relatively higher than the average concentration in Great South Bay (SCDHS 2019a, 2019b). This difference could be related to sample size, as more chlorophyll a samples were collected in Great South Bay than Carmans River (49 vs. 7 samples, respectively).

Nutrients

Excessive nutrients in the water can severely impact water quality. Coastal NYS waters experience increased nutrient concentrations due to agricultural and stormwater runoff, wastewater treatment plant discharges, fossil fuels, and improper disposal of fertilizers (Bricker et al. 1999; NYS 2019).

The nearest sewage treatment plant discharge is located offshore of Gilgo Beach, approximately 30.1 mi (26.2 nm, 48.4 km) from the SRWEC-NYS. However, the SRWEC-NYS is not expected to be impacted by that outfall, and the SRWEC-NYS does not cross any NYS designated discharge zones (Northeast Oceans Data n.d.).

Harmful algal blooms (HABs) can occur in coastal and offshore NYS waters, and the NYSDEC has been monitoring HABs occurrences since 2012 (NYSDEC 2019a). HABs within coastal and estuarine waters of NYS are most often caused by *Alexandrium fundyense, Cochlodinium polykrikoides,* or *Aureococcus anophagefferens* (NYS 2019; NYSDEC n.d.[d]). HABs in nearby NYS waters are most commonly found in Peconic Estuary, Great South Bay, Northport Bay, Huntington Bay, and Shinnecock Bay (NYS 2019).

In 2012, Hurricane Sandy made landfall as the largest hurricane in the northeast US's recorded history, causing 6 sewage spills greater than 100 million gallons into New York City waters (Climate Central 2013). The nearest spill to the Onshore Facilities was in Hewlett Bay Park (approximately 34.6 mi [55.7 km] from the Onshore Interconnection Cable), where roughly 100 million gallons of untreated sewage overflowed into the waterbody (Climate Central 2013). Although this site is more than 30 mi (48.3 km) west of the proposed Onshore Facilities, the waters surrounding Long Island have experienced long-term impacts of increased nutrient levels since Hurricane Sandy. Research shows that 69 percent of the total nitrogen load within Great South Bay is due to septic tanks and cesspools (Kinney and Vaiela 2011; LICAP 2017).

In addition to the sewage spills during Hurricane Sandy, current land use activities in Long Island continue to contribute to increased nutrient levels in both Great South Bay and Carmans River. These land uses include on-site sewage disposal used by Suffolk County residents, stormwater activity, fertilizer seepage, and atmospheric deposition (LICAP 2017).

As part of the previously described SCDHS water quality monitoring program, water samples are tested for nutrients including ammonia, nitrate, nitrite, total nitrogen, total phosphorus, orthophosphate, chloride, and sulfate. Average nutrient concentrations from the nearest Great South Bay SCDHS water quality monitoring station (90100) and the nearest Carmans River water monitoring station (95052) are included below in Revised Table 4.11-1.

Revised Table 4.11-1. Average SCDHS Water Quality Monitoring Station Nutrients Data, 2015–2019

NH_3 (mg/L)	NO_x (mg/L)	TN (mg/L)	o-PO_4 (mg/L)	TP (mg/L)
Great South Bay Monitoring Station 90100				
0.054	0.083	0.39	0.018	0.064
Carmans River Monitoring Station 95052				
0.073	1.09	1.45	0.012	0.083

KEY:
NH_3 = ammonia (filtered), NO_x = nitrite + nitrate (filtered), TN = total nitrogen, o-PO4 = ortho-phosphate (filtered), TP = total phosphorus

SOURCE:
SCDHS 2019a, b

Pathogens

Waterborne pathogens include bacteria, viruses, and other organisms that may cause disease or health problems in native species and in humans. When pathogens are present at elevated concentrations, recreational water use is adversely affected, prompting closures of public beaches and shellfish harvest restrictions.

Every NYS Park beach is sampled at least once a week for bacterial indicators in the water (NYS 2019). For saltwater beaches, samples are tested for *Enterococcus* bacteria, with exceedances over 104 Enterococci colonies per 100 mL considered harmful (NYS n.d.).

The SRWEC–NYS crosses Smith Point County Park and the Robert Moses State Park is located approximately 15.3 mi (13.3 nm, 24.6 km) from the Project. These parks have routinely passed these water quality tests (NYS 2019; SwimGuide 2020). However, bacteria from stormwater runoff does contribute to many NYS waters overall, resulting in historic shellfish bed closures within estuaries of Long Island, the NY/NJ Harbor Estuary, and the New York–New Jersey Bight (NYSDEC 2010). In 2015, Suffolk, Nassau, and

Westchester Counties, in addition to New York City coastal beaches, were forced to close or issue advisories for a collective total of 1,457 days; however, no closures or issues have been documented since 2015 (NYS 2019).

The high concentration of nutrients in Great South Bay has led to an increase in HABs. Commonly referred to as brown tides, *Aureococcus anophagefferens* blooms have significantly impacted bay scallop populations and eelgrass beds in both Peconic Estuary and Great South Bay (NYSDEC 2019a). As such, the SCDHS Office of Ecology, Public Health Related Harmful Algal Blooms (CP8224) project was initiated. This ongoing project involves monitoring HABs within Suffolk County waters to determine their potential impacts on public health (Suffolk County 2020b).

Water samples collected at the SCDHS monitoring stations are tested for total coliform and fecal coliform concentrations. At the nearest monitoring station to the Onshore Transmission Line within Great South Bay (90100), the average total coliform concentrations from 2015 to 2019 was 84.8 most probable number (MPN)/100 mL; the average fecal coliforms was 97.7 MPN/100 mL (SCDHS 2019a, 2019b). Comparatively, at the nearest monitoring station to the Carmans River crossing (Station 95052), the average total coliforms from 2015 to 2019 was 1,394.4 MPN/100 ml, with the average fecal coliforms being 212.9 MPN/100 mL.

Contaminants

Contamination in offshore US waters can occur from marine vessel spills, discharges (*i.e.*, domestic water, deck drainage, treated sump drainage, ballast water, and bilge water), and/or general trash and debris. Liquid wastes from marine vessels such as sewage, chemicals, solvents, oils, and greases could also be released. Other potential sources of contamination in offshore waters can occur from adjacent coastal cities (*i.e.*, use of pesticides, sewage outfall, dredging operations, harbor/port activity). The addition of any chemical or nutrient to the water column can cause decreases to overall water quality, dependent on the amount and type of contaminant.

Long Island Sound (which is hydrologically connected to the Rhode Island Sound and a part of the Mid-Atlantic Bight and New York–New Jersey Bight) has historically received toxic discharges from industrial waste, sewage treatment plants, and contaminated dredged spoils; in 1987 EPA banned these discharges (NYSDEC n.d.[c]). Some pesticides can remain within marine ecosystems for years and may become toxic to benthic organisms through absorption in the sediments. The NYS Department of Health (NYSDOH) issues fish consumption advisories for areas surrounding Long Island and New York City due to chemical contamination levels known to be harmful to human health (NYS 2019). Contamination advisories have been issued for polychlorinated biphenyls (PCBs), dioxins, cadmium, and mercury levels in fish tissue (NYSDOH 2012).

The SRWEC-NYS is included within EPA Region 2 for the mapping of ocean disposal sites, although no ocean disposal sites are located within this region (EPA n.d.[a]). The nearest ocean disposal sites to the SRWEC-NYS are within the boundaries of Rhode Island Sound, Long Island Sound, and Fire Island Inlet (EPA n.d.[a]), located approximately 27.6 mi (24.0 nm, 44.4 km) from the SRWEC-NYS. The Applicant collected sediment samples along the SRWEC-NYS in September 2020 to test for the presence of contamination in support of this Article VII application; results of the sediment analysis are described in Appendix 4-H.

Groundwater quality, regulated by the SCWA, can be negatively impacted by a variety of anthropogenic activities that result in contamination, including, but not limited to: stormwater runoff and infiltration, spills and releases from commercial and industrial properties, storage tanks, machinery and vehicles, road salt application, fertilizers and pesticides, agriculture, and septic systems. On Long Island, sewage systems and landfills also seep contaminants into groundwater, which can be harmful to human health because groundwater on Long Island is the sole freshwater source (NYS 2019; NYSDEC n.d.[l]).

Five active groundwater wells are located in the vicinity of the Onshore Facilities. Four of the five well sites (ID #404806072553802, 404358072520302, 404357072515702, and 404357072515703) are located approximately 0.1 mi (0.2 km) from the Onshore Transmission Cable, and one of the well sites (ID #404642072520001) is located approximately 0.01 mi (0.02 km) from the Onshore Transmission Cable. Water levels in these five active wells nearest to the Onshore Facilities have been categorized as "normal" and "above normal" (USGS 2019) and the Onshore Transmission Cable is not expected to cross any sensitive source water protection areas.

Data on water-column contaminants in the ICW such as PCBs, polycyclic aromatic hydrocarbons, DDTs, and inorganic concentrations, are limited. However, during EPA surveys in 2005 within Great South Bay (at Station VA-023), sediment contamination levels were analyzed. When compared with the NYS sediment screening benchmarks, results showed that some metals were near, or slightly exceeded, the lowest screening levels (NPS 2005) (for full results, refer to the NPS Technical Report NPS/NER/NRTR—2005/019).

Contaminant concentrations within Carmans River are monitored at the SCDHS Carmans River water quality monitoring station (95052). However, compared to other water quality data provided in previous and subsequent sections, data on organics and metals at this station are limited. Water samples were tested for metals most recently in 2015 and 2016 at the monitoring station nearest to the Onshore Facilities. These results are included in Table 4.11-2 below (SCDHS 2019a, 2019b).

Table 4.11-2. Metals Detected at SCDHS Carmans River Monitoring Station 95052, 2015–2016

Analyte Name	Units	June 2015	Sept. 2015	Dec. 2015	March 2016	June 2016
Aluminum	µg/L	36.3	9.42	42.9	33.8	11.4
Arsenic	µg/L	--	1.68	1.78		3.49
Barium	µg/L	61.8	86.5	206	96.8	99
Calcium	mg/L	13	22	40.6	10.2	15.1
Chromium	µg/L	--	--	1.56	--	--
Copper	µg/L	--	20.5	69.4	7.57	19.2
Iron	mg/l	0.216	0.187	0.134	0.13	0.188
Lead	µg/L	--	--	2.45	--	--
Lithium	µg/L	2.36	6.81	15.2	2.02	3.93
Magnesium	mg/L	12.4	46.1	104.3	9.64	23
Manganese	µg/L	133	81.4	143	120	124
Nickel	µg/L	0.33	0.59	1.06	0.63	0.66
Potassium	mg/L	4.33	14.3	35.4	3.71	7.87
Selenium	µg/L	1.24	4.48	6.61	1.14	4.06
Sodium	mg/l	100	383	859	79.6	190
Strontium	µg/L	101	298	634	91	166
Titanium	µg/L	--	1.09	--	--	--
Zinc	µg/L	15.9	28	95	28.5	30.4
SOURCE: SCDHS 2019a, 2019b						

Turbidity

Turbidity is the cloudiness or haziness (opacity) of water caused by suspended solids (*e.g.*, sediments or algae) and is measured as the concentration of TSS.

Coastal, near-shore waters are expected to have higher suspended particle concentrations and therefore higher turbidity than oceanic waters, which experience a higher flushing rate. From June 2006 to February 2014, 15 dredging project characterizations were completed within the New York – New Jersey Harbor complex (located at the apex of the New York Bight), which included water quality and TSS surveys. Average TSS ambient water samples during this time period ranged from 12.8 to 91.5 mg/L with an average of 30.9 mg/L (USACE 2015b) as compared to reported offshore concentrations previously described that ranged from 0.9 to 36.4 mg/L (Balthis et al. 2009).

Secchi disk depth measurements are taken in association with water quality monitoring samples collected at the SCDHS stations within Great South Bay and Carmans River. A Secchi disk measures water clarity by lowering a black and white disk into the water column until it is no longer visible; the depth at which the disk is last visible is then recorded. From 2015 to 2019, Secchi disk measurements at the Great South Bay monitoring station (90100) ranged from 2 ft (0.6 m) to 8 ft (2.4 m) (SCDHS 2019a, 2019b). In the same timeframe at the Carmans River monitoring station (95052), Secchi disk measurements ranged from 1.5 ft (0.5 m) to 6 ft (1.8 m) (SCDHS 2019a, 2019b).

Anthropogenic Activities

The watersheds encompassing Long Island have experienced steadily increasing development and population growth with continued residential, commercial, and industrial development. These factors have shaped the area and introduced nutrients, pathogens, and pollutants into nearshore coastal waters, streams, rivers, and intracoastal waterways. Both point and non-point sources of pollution may therefore be present within coastal NYS waters, and the effects of those sources as well as others are discussed above. Also as described above, due to anthropogenic influence, ocean temperatures are increasing, which leads to ocean acidification.

4.11.2 Potential Marine Physical and Chemical Characteristics Impacts and Proposed Mitigation

Construction and operation activities associated with the Project have the potential to cause impacts to marine physical and chemical characteristics.

Potential Construction Impacts and Proposed Mitigation

SRWEC–NYS

Potential direct and indirect impacts to marine physical and chemical characteristics during construction of the SRWEC–NYS are expected to be associated with physical disturbance and sediment suspension and deposition during installation of the cable, and indirect impacts from potential discharges and releases, and trash and debris, as described below. These impacts will be minimized to the extent practicable through implementation of the Project BMPs, and are likely to be localized, with marine physical and chemical characteristics returning to pre-existing conditions after in-water activities cease.

Installation of the SRWEC–NYS will include the following activities: seafloor preparation, cable installation, installation of cable protection, and anchoring vessels. Seafloor preparation activities are likely to include seabed debris clearance (the removal of seabed debris and boulder clearance) and sand wave leveling. To install the cable, sediments along the cable corridor will also be disturbed. Installation techniques may include mechanical plowing, jet plowing, dredging, mechanical cutting, and/or backfill plowing, and HDD construction methods (see Revised Exhibit E-3: Underground Construction for additional information on construction methodology) all of which will directly disturb seafloor sediments. CFE or suction hopper dredging may also be used in scenarios where installation to the target burial depth is not achievable using primary installation methodologies.

Nearshore, HDD techniques will minimize impacts to surficial sediment and measurable impacts to resources from the SRWEC-NYS installation. In general, this will involve drilling under the seafloor and the intertidal area using a drilling rig located onshore within the Landfall Work Area. Drilling fluid (comprised of bentonite, drilling additives, and water) will be pumped to the drilling head to stabilize the created hole. Drilling fluid will be used to prevent a collapse of the hole and to return cuttings to the Landfall drill site. Excavation of exit pits will be within the SRWEC-NYS surveyed corridor.

Sediment suspension and deposition will occur due to the SRWEC-NYS installation, HDD and installation of the HDD exit pit, causing increased turbidity. For the SRWEC-NYS installation, modeling results indicate that peak TSS concentrations reached 141 mg/L with concentrations exceeding 100 mg/L within 394 ft (120 m) of the SRWEC-NYS corridor centerline. The maximum deposition thickness was 0.4 in (10.1 mm) resulting in a small area (0.0015 ha) having a thickness greater than 0.4 in (10 mm) with a maximum extent of 24.6 ft (7.5 m) from the corridor. While the time to return to ambient turbidity levels will vary along the SRWEC-NYS corridor, the time to return to ambient levels was 0.3 hours after completion. The excavation of HDD pits resulted in peak TSS concentrations of 60 mg/L with concentrations exceeding 50 mg/L within 115 ft (35 m) of the sediment source. This activity resulted in a 0.17 acre (0.07 ha) area on the seafloor where the deposition thickness was greater than 0.4 in (10 mm), extending a maximum of 118 ft (36 m) from the source. The predicted time to return to ambient turbidity levels is 1.2 hours after completion. Additional information on methods and results of the sediment transport analysis are described in Appendix 4-H.

Boulder fields, predominantly of medium density, and sand waves were identified in the nearshore area of the SRWEC-NYS (Appendix 4-G). The Applicant has assumed a conservative maximum of 40 percent of the SRWEC-NYS will require sand wave removal prior to cable installation. The actual number will be refined following the results of the ongoing geophysical and sediment mobility studies. Where required, the Applicant has assumed the corridor will be cleared of sand wave up to 98 ft (30 m) centered on the final centerline of a distinct export cable.

The increase in turbidity from SRWEC–NYS installation, sand wave leveling, and the HDD exit pit will be temporary, with levels returning to pre-existing conditions within hours (per results of sediment transport modeling summarized above) once construction activities cease. Impacts to marine physical and chemical characteristics from sediment suspension and deposition related to installation of the SRWEC–NYS are expected to be minimal.

Potential discharges and releases during construction of the SRWEC–NYS are also identified as a potential impact to marine physical and chemical characteristics. Project-related marine vessels operating during construction will be required to comply with regulatory requirements for management of onboard fluids and fuels, including prevention and control of discharges. Trained, licensed vessel operators will adhere to navigational rules and regulations, and vessels will be equipped with spill containment and cleanup materials. Additionally, the Applicant will comply with applicable international (IMO MARPOL), federal (USCG), and NYS (NYSDEC) regulations and standards for reporting treatment and disposal of solid and liquid wastes generated during all phases of the Project.

All vessels will similarly comply with USCG standards regarding ballast and bilge water management. Liquid wastes from vessels (including sewage, chemicals, solvents, and oils and greases from equipment) will be properly stored, and disposal will occur at a licensed receiving facility. Any unanticipated discharges or releases are expected to result in minimal, temporary impacts; activities are heavily regulated and unpermitted discharges are considered accidental events that are unlikely to occur. In the unlikely event that a reportable spill occurs, proper notifications to federal, NYS, and local agencies will be made.

Where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids that may impact groundwater resources in the localized area. Any unanticipated discharges or releases within the SRWEC–NYS corridor during construction are expected to result in minimal, temporary impacts; activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Finally, in accordance with applicable federal, NYS, and local laws, the Applicant will implement comprehensive measures prior to, and during, Project construction to avoid, minimize, and mitigate impacts related to trash and debris disposal. All trash and debris will be properly stored on vessels for later disposal on land at an appropriate facility per 30 CFR § 585.626 (b) (9). All other trash and debris returned to shore will be disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any other form of solid waste or debris in the water will be prohibited, and good housekeeping practices will be implemented to minimize trash and debris in vessel work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts.

With proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Onshore Facilities

Construction of the Onshore Facilities is not expected to have an impact on the marine physical characteristics but may have direct or indirect impacts on marine chemical characteristics. Potential impacts to water quality include sediment suspension and deposition during installation of the Onshore Transmission Cable, and indirect impacts from potential discharges and releases, and trash and debris, as described below. Routing for the Onshore Transmission Cable includes crossing the ICW and Carmans River to reach the OnCS-DC. However, the trenchless construction methods currently proposed (HDD crossings) are expected to avoid direct impacts to surface waters. Therefore, no water resources are expected to be directly impacted by the Project. Additionally, the majority of the work associated with installation of the Onshore Transmission Cable will be conducted within pre-existing roadway or utility ROWs. Impacts will be minimized to the extent practicable through implementation of the Project BMPs, and are likely to be localized, with water quality returning to pre-existing conditions after permanent restoration of the Project facilities.

As previously described, the waterbodies crossed by the Project will be crossed using trenchless installation methods, which are expected to avoid direct impacts to surface waters and associated wetlands (as detailed in Section 4.7, Wetlands and Water Resources). Any indirect impacts associated with the trenchless crossings are expected to be temporary, with water quality reverting to pre-existing conditions after construction activities cease. Implementation of applicable permits and environmental protection measures such as erosion control measures and monitoring procedures during construction and development of the SWPPP as part of the Project EM&CP, along with relevant NYS and federal permits for waterbody crossing activities will further minimize impacts from disturbed sediments within waterbodies.

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods, installation of the Onshore Transmission Cable or Onshore Interconnection Cable, or during construction activities at the OnCS-DC. A SPCC Plan will be developed as part of the Project EM&CP and any discharges or release will be governed by NYS regulations. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared as part of the Project EM&CP and implemented to minimize the potential risks associated with release of drilling fluids. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts;

activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur.

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts.

Potential Operational Impacts and Proposed Mitigation

Potential impacts to marine physical and chemical characteristics from Project operations are not anticipated. The Project is anticipated to have no maintenance needs unless a fault or failure occurs due to damage from outside influences. If mechanical damage to the SRWEC–NYS should occur, repair of the cable may result in disturbance to the seafloor from maintenance vessels and activities. Localized impacts to marine deposits would be short-term and temporary.

In the event of a fault or failure of the Onshore Transmission Cable or Onshore Interconnection Cable, sediment suspension and deposition impacts would be similar to those described for the construction phase if the fault or failure occurred at or near the crossing of the ICW or Carmans River. However, should surface disturbances be required within or within close proximity of these locations, environmental protection measures will be implemented, such that impacts to resource locations are expected to be temporary and minimal.

Due to the distance of the OnCS–DC the marine environment, impacts are not anticipated. While the OnCS–DC will require various oils, fuels, and lubricants to support its operation; as a result of the distance to the marine environment as well as the Applicant's intent to prepare and implement an SPCC, the OnCS–DC is not anticipated to result in impacts to the marine environment.

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during operations of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto a marine area is unlikely.

Proposed Environmental Protection Measures

As discussed throughout this section, the Applicant will implement the following environmental protection measures to reduce potential impacts on marine physical and chemical characteristics. These measures are based on protocols and procedures successfully implemented for similar projects.

- To the extent feasible, installation of the SRWEC–NYS will occur using methods such as mechanical plow, jet plow, and/or mechanical cutter which will minimize impacts to marine geology, compared to open-cut dredging.
- DP vessels will be used for installation of SRWEC–NYS to the extent practicable. Use of DP vessels will minimize impacts to the seabed, compared to use of a vessel relying on multiple anchors.
- The SRWEC–NYS landing will utilize HDD to avoid impacts to the nearshore zones and surficial geologic resources. The Onshore Transmission Cable will also be installed via HDD under the ICW to avoid impacts to coastal resources; HDD and trenchless methods will also be used elsewhere onshore, where appropriate, to minimize impacts to surface locations and resource areas.
- Where HDD is utilized, an Inadvertent Return Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids.
- The Applicant will require all construction and operation vessels to comply with applicable International Convention for the Prevention of Pollution from Ships (IMO MARPOL), federal (USCG and EPA), and NYS regulations and standards for the management, treatment, discharge, and disposal of onboard solid and liquid wastes and the prevention and control of spills and discharges.

4.12 NOISE

In accordance with PSL § 122 (1) (C) and 16 NYCRR §§ 86.5 (a) and 86.5 (b) (8), this section includes an analysis of the potential noise impacts resulting from the construction and operation of the onshore components of the Project.

The Applicant conducted a study to evaluate onshore Project-related construction and operation noise in support of this Article VII application, which is documented within Revised Appendix 4-I – Onshore Acoustic Assessment.

Information on the potential effects of underwater noise and the details of potential effects to marine organisms from construction of the SRWEC–NYS are discussed in Section 4.9, Benthic and Shellfish Resources; Section 4.10, Finfish and EFH; and Section 4.11, Marine Mammals and Sea Turtles.

4.12.1 Acoustic Concepts and Terminology

This section outlines some of the fundamental concepts in acoustics to help the public understand the modeling assessment and results as presented in this section.

Acoustics is the science of mechanical waves in gases, liquids, and solids, including its production, transmission, and effects. The human ear is sensitive to variations in air pressure that are perceived as sound. Noise is generally defined as unwanted sound, and exposure to noise at high levels has been associated with negative physiological and psychological outcomes.

Sound pressure levels are measured on a relative logarithmic scale where 0 dB represents the threshold of human hearing at 1 kilohertz (kHz) (20 µPa). The instantaneous SPL varies over time, and the average and maximum values are often of interest. The equivalent continuous sound pressure level (L_{eq}) is a metric that represents the average magnitude of sound over time as a single number; it is the level of constant pressure that results in the same total sound energy as the actual time-varying sound during the same time period. L_{eq} is often calculated at the resolution of 1 second or 1 hour.

The perceived loudness of sound varies with frequency as well as with sound pressure, and SPL measurements are often adjusted according to a weighted scale. A-weighting was designed to approximate the subjective response of the ear at low sound amplitudes. Most noise measurements and regulatory thresholds are described by the A-weighted equivalent continuous SPL (the sound level, or L_A) measured in dB. Note that changes in the sound level do not proportionately translate to changes in apparent loudness. A change in 3 dB is just perceptible, whereas a change of 5 dB is clearly noticeable. A change of 10 dB is often described as a doubling of loudness, although this rule of thumb only holds under certain circumstances.

Ambient sound is the all-encompassing sound associated with a given environment and is usually a composite of sound from many sources and many directions, near and far, including any specific sources of interest. Numerous metrics have been devised to describe ambient sound conditions and the variation of the short-term sound level over much longer periods. Percentile levels indicate the short-term sound level exceeded over a longer period, such as 1 hour. The L_{50} is the sound level exceeded 50 percent of the measurement period (the median sound level) and often is used to summarize inconsistent conditions. Similarly, the L_{10} and the L_{90} are the sound levels exceeded 10 percent and 90 percent of the measurement period, respectively; large differences between these metrics may be indicative of transient events. The L_A can be averaged over a particular period, such as the daytime hours from 7:00 AM to 10:00 PM (the daytime sound level, or day L_A) and the nighttime hours from 10:00 PM to 7:00 AM (the nighttime sound level, or night L_A). The day-night average sound level (L_{dn}) is the annual average sound level over 24 hours with an additional 10 dB added to nighttime hours. In quiet natural and residential areas, high-frequency sounds such as measurement equipment's electrical noise, wind-induced sounds, and sound from insects or birds can make large contributions to A-weighted SPL. However, these sounds do not typically have the capacity to mask, or inhibit perception of, noise sources.

In addition to A-weighting, the ANS-weighted sound level (natural sound level or L_{ANS}) is an effective way to characterize conditions (ANSI 2014). The natural sound level is the standard A-weighted sound level filtered to exclude sounds above the 1 kHz octave band. This weighting can be used to characterize sound levels in natural and quiet residential areas with respect to noise from transportation, construction, and industrial sources.

For reference, Table 4.12-1 presents qualitative examples of sounds and corresponding sound levels (Norton 2003). The examples in Table 4.12-1 merely illustrate typical sound levels; the actual received sound level in any given situation depends on the sound power level (L_W) of the particular source, the distance from the source, and many other factors that affect acoustic propagation between the source and receiver.

Table 4.12-1. Qualitative examples of sound levels

L_A (dB)	Qualitative Scale
140	Threshold of pain
120	Jet take-off at 200 ft
110	Car horn at 3 ft
100	Shouting into an ear
90	Heavy truck at 50 ft
80	Pneumatic drill at 50 ft
70	Highway traffic at 50 ft
60	Room air conditioner at 20 ft
50	Normal conversation at 10 ft
40	Wind at 11 miles per hour (mph)
30	Soft whisper at 10 ft
0	Threshold of hearing

4.12.2 Applicable Noise Standards

This section describes the federal, NYS, and local noise regulations applicable to Onshore Facilities. Policies and ordinances issued by regulatory agencies specify criteria with which the onshore components of the Project must comply, including permissible noise limits.

US Environmental Protection Agency

The Noise Control Act of 1972 authorized federal agencies to address sources of noise, including motor vehicles, machinery, and other commercial products, that may endanger the health and welfare of the nation's population. The act authorized the EPA to issue noise emission regulations for noise sources, and the EPA published sound levels of noise that were required to protect public health under the act (EPA 1974). These levels were issued to provide guidelines for state and local governments in setting standards. The primary responsibility of regulating noise has since been delegated to state and local governments, but the Noise Control Act of 1972 and the Quiet Communities Act of 1978 remain in effect today.

To protect public health and welfare regarding interference with outdoor activity, speech intelligibility, and annoyance, the EPA specified a day-night average sound level of 55 dB for residential areas. The EPA noise guidelines are based on chronic exposure to pervasive noise over a long period. Therefore, these guidelines are not typically applied to short-term activities, such as construction activities. As such, the EPA noise guidelines are only considered in regard to the operational noise from the OnCS–DC at noise sensitive receptors (NSR) in residential areas.

NYSDEC Noise Guidelines

In addition to the EPA noise guidelines, the NYSDEC has published a policy and guidance document, *Assessing and Mitigating Noise Impacts* (NYSDEC 2001). The NYSDEC policy document provides guidance on the evaluation of noise, identification of when noise levels may cause a significant environmental impact, and methods for noise impact avoidance and reduction. The NYSDEC policy addresses noise thresholds and mitigation for both the construction and operation phases of a proposed project. Considering that construction related noise is short-term relative to operational noise, the potential impacts are assessed separately.

The NYSDEC guidance recommends that the potential for noise impacts initially be determined by a preliminary noise assessment that considers all construction and operation activities of the project. If this assessment and the subsequent impact analysis indicates that sound levels at NSRs will be "similar to or only slightly elevated as compared to ambient conditions," no further evaluation is required. When there is an indication that "marginal or significant noise impact may occur," a detailed noise analysis is required that includes a more comprehensive consideration of acoustic propagation, factors such as land use, and whether or not the introduction of the noise will be "considered annoying or obtrusive." If analyses indicate that a significant noise impact may occur, NYSDEC policy requires implementation of mitigation, such as reducing noise at the source or installing noise barriers, to avoid or diminish the noise effects to acceptable levels. BMPs will also be considered to reduce noise by means of modifying noise-generating equipment, limiting the time of noisy operations, or relocating noise sources farther away from NSRs.

The NYSDEC policy includes guidance to assess noise impacts and determine the need for mitigation. The noise thresholds are based on the increase in the sound level from the existing level, which necessitates evaluation of pre-construction ambient (baseline) conditions. As described by NYSDEC's policy, an increase in sound level “ranging from 0-3 dB should have no appreciable effect on receptors” and does not require mitigation. An increase of greater than 3 dB has the potential for adverse impact and may require mitigation depending on the NSRs present. Mitigation is generally needed in residential areas if a long-term increase greater than 6 dB is anticipated. An increase of 10 dB deserves consideration of avoidance and mitigation measures in most cases, including short-term construction noise at residential properties.

The addition of any noise source should not raise the ambient sound level above 65 dB in a non-industrial setting, or above 79 dB in an industrial or commercial area according to NYSDEC policy. If existing conditions exceed the threshold, the total sound level considering contributions from existing sources and expected noise sources should not exceed existing conditions. It is recommended that mitigative measures and BMPs be used to minimize the effects of construction noise if analyses show that the threshold may be exceeded.

Suffolk County Code

The Suffolk County Code, Chapter 618, limits the level of noise produced on County-owned properties (Suffolk 1999). Noise will occur from construction of the Project’s Onshore Transmission Cable in county parks (*e.g.*, Smith Point County Park, Smith Point Marina, and Southaven County Park) and along county roadways.

The Suffolk County noise code specifies a maximum permissible sound level that depends on the time of day and receiving property category. The maximum permissible sound level includes both the noise emitted from the Project as well as the existing sound level. The sound level limits are 65 dB at residential property boundaries between the hours of 7:00 AM and 10:00 PM, 50 dB at residential properties between the hours of 10:00 PM and 7:00 AM, 65 dB at commercial properties (all times), and 70 dB at industrial properties (all times). The code does not specify limits for receivers on county property, and residential property limits are assumed to apply.

Noise from construction activities is exempt from the permissible limits between 7:00 AM and 6:00 PM on weekdays. Noise from construction activities must meet the permissible limits specified above between the hours of 6:00 PM and 7:00 AM the following day on weekdays, and any time on weekends and legal holidays.

Town of Brookhaven Ordinances

The Town of Brookhaven’s Town Code, Chapter 50, prohibits excessive noise that may jeopardize the health, welfare, or safety of the citizens or degrade the quality of life (Brookhaven 1987). This local noise code applies to sound originating from sources located within the Town of Brookhaven limits and applies to long-term operation and short-term construction activities associated with the Project. The ordinance specifies a maximum permissible sound level that depends on the receiving property category and time of day. The maximum permissible sound level includes both the noise emitted from the Project as well as the existing sound level and is evaluated at or within the property line of the receiving property.

To maintain substantive compliance with the Town of Brookhaven Noise Control ordinance, long-term operation of the Project facilities would be limited to generating a sound level of 65 dB at residential properties between the hours of 7:00 AM and 10:00 PM, 50 dB at residential properties between the hours of 10:00 PM and 7:00 AM, 65 dB at commercial properties (all times), and 75 dB at industrial properties (all times). Noise from construction activities is exempt from the noise limits between 7:00 AM and 6:00 PM on weekdays. Construction activities are prohibited between the hours of 6:00 PM and 7:00 AM the following day on weekdays, and any time on weekends and legal holidays.

4.12.3 Existing Conditions

This section summarizes the results of the locations of NSRs, the field survey of existing ambient conditions, and the existing conditions at NSRs used to assess potential noise impacts.

A comprehensive sound survey that establishes existing ambient conditions is necessary to assess the potential impacts of introducing new sources of noise. The existing (*i.e.*, pre-construction) ambient conditions can be compared to the expected noise generated by the Project to calculate the change in sound levels and total sound levels at each NSR. In addition, existing conditions may affect the context in which noise from the Project is assessed.

NSRs were identified in the vicinity of the Project and included at nearby residences, public lands, commercial properties, and industrial properties. Existing ambient conditions at NSRs were assessed using a combination of analytical methods and the results of a field survey. NYSDEC policy requires measurements when there is concern that analytical estimates are not of sufficient accuracy. Short-term attended monitoring was used to characterize existing conditions at NSRs near sites of temporary construction activities (see Revised Figure 4.12-1). Short-term survey locations were sampled to characterize ambient conditions for 30 minutes or longer during both daytime and nighttime periods. Long-term measurements using continuous unattended monitoring were conducted at sites where greater accuracy was required and access was available. At sites where long-term operational noise sources are expected (*i.e.*, the OnCS–DC), measurements were conducted over multiple days to quantify the range of existing ambient conditions during the daytime and nighttime periods.

Existing ambient conditions at NSRs were assessed using analytical methods and the results of a field survey. Analytical methods have been used to estimate existing conditions along the Onshore

Transmission Cable and Onshore Interconnection Cable. Existing ambient conditions have been assessed using field measurement data at sites including: the Landfall HDD and ICW HDD, at trenchless crossings along the Onshore Transmission Cable and Onshore Interconnection Cable, and at the Union Avenue Site.

Analytical Estimates of Existing Conditions

Guidance from the Federal Transit Administration (FTA) describes a method to estimate a neighborhood's existing noise exposure based on proximity to nearby major roadways or railroads (FTA 2018). The type and distance to the roadway was used to determine the daytime and nighttime sound level for NSRs in proximity to major roadways. These levels conservatively underestimate existing conditions to account for the reduced precision compared to field measurements. In communities far from major sources of transportation noise, a relationship between population density and the day-night average sound level (L_{dn}) originally developed by the EPA was used to estimate ambient sound levels (Schomer 2011). The existing sound level at most NSRs was estimated to be 50 dB during the day and 44 dB during the night per the EPA method for predicting community noise.

There are two major roadways within close proximity to the Onshore Transmission Cable. The LIE was categorized as an 'interstate highway' by the FTA method. The closest NSRs are approximately 135 ft (41 m) from the property line to the geometric mean of the LIE and existing sound levels were estimated to be 65 dB during the day. Sunrise Highway (SR 27) was categorized as an 'other roadway' according to the FTA method. The closest NSR is approximately 220 ft (67 m) from the property line to the geometric mean of this roadway and existing ambient sound levels were estimated to be 55 dB during the day. The Onshore Interconnection Cable will be located primarily within existing roadway along Union Avenue and existing utility-owned or controlled property. Union Avenue is a neighborhood street that is not classified as a major roadway. Existing conditions at NSRs are expected to vary with proximity to the LIE. The closest NSRs are approximately 200 ft (61 m) from the property line to the geometric mean of the LIE, and existing sound levels were estimated to be 65 dB during the day by the FTA method.

Field Measurements of Existing Conditions

Unattended long-term monitoring was conducted at two survey locations (SL-1 and SL-2) and short-term attended monitoring was conducted at nine survey locations (SS-3 to SS-11) from September 23 to September 26, 2020 (see Revised Figure 4.12-1). Given the potential for 24-hour activity (operation and/or construction) at Project sites, both day (7:00 AM to 6:00 PM) and night (10:00 PM to 7:00 AM) conditions were assessed at short-term survey locations. L_{ANS} was used to characterize existing conditions at NSRs due to the significant influence of insects, birds, leaf rustle, and other natural sources of sound on the A-weighted sound level measurements during the field survey.

Existing ambient conditions at survey locations near the Landfall HDD and ICW HDD were influenced by typical community noise sources such as road traffic. Other prominent sources of sound at survey locations were insects, birds, ocean surf, watercraft, and general aviation. Existing sound levels recorded during the survey ranged from 45 to 50 dB during the day and 35 to 44 dB at night (see Table 10 in Revised Appendix 4-I).

At the trenchless crossings (*e.g.*, Sunrise Highway, Carmans River and LIRR), the most critical NSRs were identified based on land use and the expected locations of the drilling operation entry and exit pits. Most nearby properties are zoned as residential. Commercial, industrial, open space, and County managed natural areas are also in close proximity to construction sites at some trenchless crossings. Existing ambient conditions at survey locations were strongly influenced by typical community noise sources such as road traffic. Other prominent sources of sound at survey locations were insects, birds, and landscaping equipment. Field measurements were conducted at one or more survey locations near each trenchless crossing, and the results indicated that existing sound levels at the trenchless crossings ranged from 55 to 65 dB during the day and 48 to 63 dB at night (see Table 11 in Revised Appendix 4-I). Existing conditions exceed the nighttime permissible sound level limit for construction noise per the Suffolk County noise code at residential NSRs associated with the trenchless crossing of Sunrise Highway at Revilo Avenue as well as the trenchless crossing of Carmans River.

Nearby residential properties are also located to the south on Fairfield Drive East; these are the closest NSRs to the Union Avenue Site are approximately 1,300 ft (396 m) distant. Existing conditions at survey locations near the Union Avenue Site were influenced by typical community noise sources such as road traffic. Other prominent sources of sound at these survey locations were insects, birds, leaf rustle, and noise from nearby industrial facilities. Existing sound levels range from 56-60 dB during the day and 52-61 dB at night (see Table 9 in Revised Appendix 4-I). As shown on Table 9 in Revised Appendix 4-I, existing conditions exceed the nighttime permissible sound level limits for operational noise at residential properties per the Town of Brookhaven noise code and the day-night average sound level as specified by the EPA at NSRs in the residential areas surrounding the Union Avenue Site.

4.12.4 Predictive Noise Modeling

As described in more detail in Revised Appendix 4-I, predictive noise modeling was conducted to provide the spatial distribution of the expected sound levels from Project activities and mitigation, including sound levels at NSR locations. Two models were used, SoundPLAN and the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM), both of which are described below.

SoundPLAN is a standards-based software providing industrial noise calculations in accordance with all known international standards, including the International Organization for Standardization (ISO) 9613 standard for sound propagation outdoors (ISO 1996). The ISO 9613 standard describes an analytical method of calculating the attenuation of sound propagation outdoors that accounts for numerous physical effects.

The FHWA's RCNM is a national model for the prediction of construction noise (FHWA 2006) and provides the received noise level at specified distances from the construction activity. RCNM includes a database of sound emissions for commonly used construction equipment such as dump trucks, backhoes, concrete saws, air compressors, and portable generators.

4.12.5 Potential Noise Impacts and Proposed Mitigation

This section details potential impacts from noise generated during the construction and operation phases of the Onshore Facilities.

Potential Construction Impacts and Proposed Mitigation

The following sections provide a summary of the potential noise impacts associated with the proposed construction activities and proposed mitigative measures associated with each type of construction activity.

SRWEC–NYS, Onshore Transmission Cable and Onshore Interconnection Cable - HDD/Trenchless Crossings

Temporary noise will be generated from HDD operations and installation of trenchless crossings. HDD will be used to land the SRWEC–NYS in Smith Point County Park and again where the Onshore Transmission Cable will cross the ICW. In addition, HDD or horizontal auger boring (HAB) construction is anticipated at trenchless crossings along the Onshore Transmission Cable and Onshore Interconnection Cable corridors (see Revised Exhibit E-3: Underground Construction). Multiple construction phases are anticipated at HDD and HAB sites including site preparation, drilling operations during cable installation, and restoration, as further detailed in Revised Appendix 4-I.

Noise from site preparation at HDD and HAB sites is expected to generate noise of approximately 94 dB at a distance of 50 ft (15 m) from the center of HDD and HAB construction activities if unmitigated. At the Landfall HDD, ICW HDD, and all trenchless crossings, permissible noise limits are expected to be exceeded at one or more NSRs per NYSDEC policy. After implementing noise control strategies for pile driving as outlined in Revised Appendix 4-I (*e.g.*, using vibratory pile driving in place of impact pile driving and installing an acoustically-treated enclosure), site preparation is expected to produce a total sound level of approximately 84 dB at 50 ft (15 m). Permissible noise limits are not expected to be exceeded at the Landfall HDD, the ICW HDD, or trenchless crossings along the Onshore Interconnection Cable corridor. Construction noise from site preparation would exceed NYSDEC criteria at nearby NSRs for all trenchless crossings along the Onshore Transmission Cable corridor. Therefore, BMPs for construction as outlined in Revised Appendix 4-I will be implemented to further reduce noise levels at these sites. At sites where noise barriers or other mitigative measures are planned for subsequent drilling operations, the barriers will be erected prior to construction and quiet technology also utilized to reduce noise impacts from site preparation. As the activities associated with site preparation are anticipated to be of relatively short duration and limited to the daytime hours, this construction is not expected to cause an adverse impact after implementing mitigation measures.

Mitigative measures are warranted at the Landfall HDD, the ICW HDD, and all HAB and HDD sites along the Onshore Transmission Cable corridor to attenuate noise from drilling operations below permissible noise limits, as detailed in Revised Appendix 4-I. The proposed noise mitigation plan for drilling operations at HDD and HAB sites will include acoustically-treated construction equipment as detailed in Table 13 in Revised Appendix 4-I. Quiet technology pumps and generators that are designed with a complete sound attenuating enclosure and include exhaust mufflers will provide a noise reduction of 15 to 20 dB over standard models. A quieter HDD rig will be used that incorporates engine exhaust silencers and partial noise barriers around the hydraulic power unit, engine jacket-water coolers, and mud mixing/cleaning system. At HAB sites, a newer model HAB rig will be used that is up to 15 dB quieter than typical older rigs. At specified HDD and HAB sites, a temporary noise barrier system will also be installed around the perimeter of the construction site to reduce the noise of HDD operations.

Table 14, Table 15, and Table 16 of Revised Appendix 4-I summarize the estimated day and night sound levels due to existing conditions, Project activities, and contributions from both (*i.e.*, the predicted total sound level) at the NSRs for scenarios involving construction drilling operations with mitigative measures. After implementing feasible noise controls, construction activity at the trenchless crossings of the Sunrise Highway at Revilo Avenue, and Carmans River at Victory Avenue is expected to exceed the permissible sound level as specified by Suffolk County at one or more NSRs. Drilling operations at all other sites will comply with all applicable regulations. BMPs for construction activities will be implemented at HDD and HAB sites indicated in Table 13 and described in Section 6 of Revised Appendix 4-I to further minimize the total sound level. Since these construction activities are anticipated to be of relatively short duration, drilling operations are not expected to cause an adverse impact.

Drilling operations will require continuous operation over several months and will likely include nighttime construction. As discussed in Revised Exhibit 7: Local Ordinances, the Applicant requests a waiver of the regulations contained in both the Suffolk County Code (§ 618-5 [B] [3]) and Town of

Brookhaven Town Code (§ 50-6 [C] [7]) to perform certain construction activities on a continuous basis to maintain the integrity of the installation (*e.g.*, a bore hole to prevent damage to or loss of a bore hole, or HDD installation and cable pulling).

Onshore Transmission Cable and Onshore Interconnection Cable – Duct Bank Installation
Construction activities are expected to introduce temporary noise sources associated with the different phases of installation of the duct bank along the Onshore Transmission Cable and Onshore Interconnection Cable corridors. These activities are assumed to include clearing the ROW, removing pavement, trenching, laying pipe, constructing the duct bank and vaults, installing and testing cable, and site restoration.

The most critical NSRs are the abutting residential properties along the Onshore Transmission Cable corridor. Although distance varies along the corridor, the property line of many residential areas is set back approximately 40 ft (12 m) from the road centerline along which the corridor proceeds. Construction of the Onshore Transmission Cable will generate noise of approximately 88 dB at a distance of 40 ft (12 m) from the center of construction activities. Construction noise from the Onshore Transmission Cable is expected to exceed the NYSDEC noise limit of 65 dB at distances of up to 550 ft (168 m). Construction of the Onshore Interconnection Cable is also expected to exceed the NYSDEC noise limits at NSRs adjacent to the corridor.

BMPs outlined in Section 6 of Revised Appendix 4-I will be implemented to diminish construction noise impacts. Because construction will continuously progress along the corridor, exposure to noise at any particular location will be temporary. Since the activities associated with installation of the Onshore Transmission Cable and Onshore Interconnection Cable are anticipated to be of relatively short duration and limited to daytime hours, this construction is not expected to cause adverse impacts. If issues are identified and further attenuation is required, temporary barriers or curtains may be erected around the noisiest equipment or the entire work area, as practical. Acoustical insulation that consists of a sound-absorptive material bonded to a mass-loaded vinyl curtain may be attached to a chain link fence in overlapping sections. Alternatively, sound barriers can be constructed on the work site from common construction building materials (plywood, block, stacks, or spoils), if necessary. To be effective, these should be lined with sound absorbing material and strategically placed as close to the noise source or NSR as possible.

In some areas, construction along the Onshore Transmission Cable and Onshore Interconnection Cable corridors may be requested to occur at night to mitigate traffic impacts. As discussed in Revised Exhibit 7: Local Ordinances, the Applicant requests a waiver of the regulations contained in both the Suffolk

County Code (§ 618-5 [B] [3]) and Town of Brookhaven Town Code (§ 50-6 [C] [7]) to perform certain construction activities at night.

OnCS-DC

The construction of the OnCS-DC is expected to result in a temporary increase in noise levels near the construction site. Activities associated with construction include site preparation, construction of foundations and buildings, installation of equipment, and finishing, as further detailed in Revised Appendix 4-I. Demolition of existing buildings may be required at the Union Avenue Site and minimal tree clearing and processing may also be required. The primary noise generating equipment anticipated for construction of the OnCS-DC is summarized in Table 4 in Revised Appendix 4-I.

Construction activities are expected to occur primarily during the daytime, and nighttime construction activities have not been separately evaluated. During daytime hours, noise is exempt from both the Town of Brookhaven and Suffolk County noise ordinances; however, noise at NSRs will be limited to 65 dB at residential properties and 79 dB at industrial properties per NYSDEC policy. Noise from OnCS-DC construction at the Union Avenue Site will not exceed permissible sound level limits as specified by NYSDEC policy.

Construction of the OnCS-DC at the Union Avenue Site is expected to generate a sound level of approximately 86 dB at a distance of 50 ft (15 m) from the center of the activity, 79 dB at a distance of 110 ft (33.5 m), and 65 dB at a distance of 550 ft (167.6 m). The closest residential NSR is approximately 1,300 ft (396 m) away from the center of construction activities, and construction noise at that distance is anticipated to be 58 dB, per results of modeling efforts. This indicates that the sound level of construction noise at residential NSRs would be similar to existing conditions. The closest industrial properties are approximately 220 ft (67 m) away from the center of construction activities at the Union Avenue Site. Construction is expected to generate noise of approximately 73 dB at the closest NSR in an industrial area. Therefore, modeling indicates that construction noise at the Union Avenue Site is not expected to exceed permissible sound level limits at NSRs. Noise from OnCS-DC construction will be below permissible sound level limits and mitigation to attenuate construction noise will not be warranted at the Union Avenue Site. BMPs will be implemented at Union Avenue Site to further reduce noise in industrial areas per NYSDEC policy.

Vehicular Traffic

Construction of the Onshore Facilities will require a temporary increase in construction vehicle related traffic, and associated vehicle noise within the relatively-dense, residential areas of the Town of Brookhaven, as well as the area around Smith Point County Park, Smith Point Marina, and Southaven

County Park. Vehicles will include heavy equipment (*e.g.*, excavators, cranes, dump trucks, and paving equipment), and the increase in noise levels is expected to be comparable to that experienced during typical roadway or utility construction work. This traffic will cease following completion of the specific construction activities as described in detail in Revised Exhibit E-6: Effect on Transportation.

Potential Operational Impacts and Proposed Mitigation

The only noise regularly expected during the operation phase of the Project is operation of the OnCS-DC. Noise from routine operation of the SRWEC-NYS, Onshore Transmission Cable, and Onshore Interconnection Cable are not anticipated, except during routine maintenance that may require short-term use of equipment with noise emissions to facilitate inspections and repairs.

OnCS-DC Operational Noise

Operation of the OnCS-DC will introduce new sources of noise. Predictive models of the operating OnCS-DC assumed simultaneous operation of the transformers and other prominent components under maximum operating conditions, and operational noise was assumed to be constant over 24 hours of the day. The most prominent noise sources of an operating OnCS-DC are the converter transformers, reactors, filters, and outdoor heating, ventilation and air conditioning (HVAC) equipment associated with the valve hall. Other noise sources such as corona sources, switching devices, generators, DC equipment, and thyristor valves are transient, insulated within buildings, or otherwise do not typically make significant contributions to the overall equivalent continuous sound level.

For the OnCS-DC at the Union Avenue Site, the converter transformers and shunt reactors will be installed with a reduced sound rated model. Reduced sound transformers incorporate various forms of acoustical treatments and have a sound power level less than a National Electrical Manufacturers Association (NEMA) standard transformer. If reduced-sound transformers and reactors will not provide sufficient attenuation, these components will be provided with sound attenuation walls to achieve the required sound levels. Additional mitigation will be implemented to reduce noise from the valve cooling tower.

The highest Project sound levels due to OnCS-DC operation at the Union Avenue Site will be at nearby industrial properties. At NSRs in residential areas, existing conditions exceed the nighttime permissible sound level limits for operational noise per the Town of Brookhaven noise code and the day-night average sound level as specified by the EPA. As limits are already exceeded due to existing conditions, noise controls have been specified to avoid increases in the total sound levels at NSRs per NYSDEC policy. Considering the Union Avenue Site and the residential NSRs, the highest Project sound level will be approximately 42 dB at night, which is an increase of 0 dB over existing conditions (see Table 17 in

Revised Appendix 4-I). The highest increase in the ANS-weighted L_{90} at a residential NSR due to OnCS-DC operation at the Union Avenue Site would be 2 dB. The OnCS-DC operational noise is constant and, although daytime levels were also considered, the sound level at night is the limiting case because the threshold for increased noise is lower during this time period. The increase in sound levels due to OnCS-DC operation should have no appreciable effect on NSRs per NYSDEC policy. With the application of proposed mitigative measures, the predicted total sound levels of the OnCS-DC will comply with all applicable criteria as specified by the EPA, NYSDEC, and the Town of Brookhaven.

Protective Environmental Measures

As discussed throughout this section, the Applicant will implement BMPs to minimize noise impacts to the community. In addition to the specific mitigative measures for noise abatement described above and in Revised Appendix 4-l, BMPs will be implemented to reduce noise from specified Project construction activities. The BMPs will be implemented when reasonable and effective while maintaining public safety and adhering to other Project requirements as applicable. The following BMPs include guidance for both equipment and administrative controls and are based on protocols and procedures successfully implemented for similar projects:

- The construction of the SRWEC-NYS at Smith Point County Park is expected to occur outside the summer tourist season, which is generally between Memorial Day and Labor Day. The construction schedule for the remaining Onshore Facilities will be developed to minimize activities within local communities during the summer tourist season, whenever feasible.
- The OnCS-DC is being sited near an existing substation on a parcel zoned for commercial and industrial/utility use.
- Construction equipment will be appropriately specified for the task. Overpowered or underpowered equipment may unnecessarily generate excessive noise.
- The quietest equipment feasible will be used for construction activities. Newer equipment is generally quieter than old equipment. Using quiet machinery is one of the most effective methods for diminishing noise impacts.
- Construction equipment will be equipped with noise-reducing devices, including mufflers, silencers, covers, guards, and vibration isolators, as applicable. Mobile equipment, such as jackhammers and welders, will be shielded with portable enclosures or shrouds, as applicable. Noise producing equipment using internal combustion engines will be equipped with effective inlet silencers and exhaust mufflers to control engine noise.

- Ensure that construction equipment is well maintained. Loose or worn parts can result in increased noise levels.
- To the extent feasible, restrict the noisiest operations to normal work hours during the day.
- Relocate the noisiest equipment far from NSRs whenever possible. During the planning stages of the Project, it may be possible to designate storage areas far from NSRs. When this is not possible, the storage of waste materials, earth, and other supplies may be able to be positioned such that they also function as a noise barrier.
- Erect additional sound barriers around the noisiest equipment or near the noise sensitive receptor, as practical.
- Route truck traffic away from residential streets and select streets with the fewest homes if other alternatives are not available.
- Do not allow engine-driven equipment to idle unnecessarily near NSRs.
- Back-up alarms should be used when required for safety only and replaced with strobe lights when possible.
- Inform the public about the time and nature of construction activities. Open communication and providing neighbors with information is a critical step towards minimizing noise impacts to the community.

4.13 ELECTRIC AND MAGNETIC FIELDS

This section includes an assessment of EMF associated with the construction and operation of the Project.

EMFs are an invisible force surrounding many types of electrical devices and are commonly associated with power lines and substations. EMFs also occur naturally, for example, strong electric fields are produced during thunderstorms and the earth's magnetic field (used for compass navigation) is ubiquitous everywhere on earth.

Each of the electrical elements for the Project, including the SRWEC–NYS, Onshore Transmission Cable, and Onshore Interconnection Cable and OnCS–DC, could be sources of magnetic fields and induced electric fields. As described in Revised Exhibit 5: Design Drawings and Revised Exhibit E-1: Description of Proposed Line, the Project consists of both DC transmission components (*i.e.*, the SRWEC–NYS and the Onshore Transmission Cable) and AC transmission components (*i.e.*, the Onshore Interconnection Cable).

The electric field from all the underground cables is blocked by the cable insulation and armoring as well as the earth, and therefore, will not be a direct source of any electric field above ground.

Magnetic fields associated with electricity flowing through cables are reported as magnetic flux density in units of mG, where 1 Gauss is equal to 1,000 mG. The SRWEC–NYS and Onshore Transmission Cable will generate a DC magnetic field (which will vary with power generated but will not change direction as an AC magnetic field would), and the Onshore Interconnection Cable will generate an AC magnetic field for which the direction oscillates 60 times each second (*i.e.*, with a frequency of 60 Hz).

The earth's natural geomagnetic field (used for compass navigation) is ubiquitous everywhere on earth and is a static (*i.e.*, DC) magnetic field, meaning that it does not vary substantially in strength or direction with time. The DC magnetic field generated by the SRWEC–NYS and the Onshore Transmission Cable will combine by vector addition with the geomagnetic field (*i.e.*, the DC field from the cables may locally increase or decrease the DC geomagnetic field near to the cable). The magnetic fields around the Project's conductors will vary depending on the magnitude of the electrical current—expressed in units of amperes (A)—that flows through the cables. The Applicant modeled the 0-Hz DC (*i.e.*, static) magnetic field produced during operation of the SRWEC–NYS and the Onshore Transmission Cable as well as the 60-Hz AC magnetic-field levels produced during operation of the Onshore Interconnection Cable (Revised Appendix 4-J).

The NYSPSC Interim Policy guidelines requires magnetic-field calculations be performed for operation at current flows equal to the winter normal conductor rating and evaluated at the edge of the transmission line ROW. A ROW is not specified for portions of the Project and so all comparisons to the NYSPSC limit were performed at a distance of 10 feet from the centerline of the SRWEC–NYS, Onshore Transmission Cable and Onshore Interconnection Cable.

Details on potential EMF effects to marine organisms from the SRWEC–NYS are discussed in Section 4.9, Benthic and Shellfish Resources, Section 4.10, Finfish, and EFH and Section 4.11, Marine Mammals and Sea Turtles.

4.13.1 Existing Conditions

Existing electric and magnetic fields conditions in the vicinity of the Project are the result of natural phenomena and/or existing, nearby operational electrical facilities.

Electric and magnetic-field levels are routinely assessed in terms of standards and guidelines developed by scientific and health agencies to protect health and safety and are based on reviews and evaluations of relevant health research.

NYS specifies guidelines and limits for AC electric and magnetic fields produced by transmission infrastructure for utility companies seeking Certificates of Environmental Compatibility and Public Need under Article VII for lines operating at voltages of 100 kV or higher. In 1978 the NYPSC established guidelines for AC electric fields generated by new transmission lines in Opinion No. 78-13. However, since the SRWEC–NYS, Onshore Transmission Cable and Onshore Interconnection Cable will not be a direct source of electric field above ground due to the cable's construction, duct bank, and burial underground, electric fields are not further addressed.[2]

In 1990, the NYSPSC established guidelines for AC magnetic-field levels for new transmission lines in its Interim Policy Statement on Magnetic Fields. This Interim Policy Statement limits the magnitude of AC magnetic fields generated by Article VII transmission lines to 200 mG or less at the edge of the ROW. In addition, this Interim Policy Statement requires that the magnetic-field level is to be assessed at 3.3 ft (1 m) above the ground, with the transmission line operating at a current flow equal to the winter normal conductor (WNC) rating.

Although both the 1978 Opinion No. 78-13 and the 1990 Interim Policy Statement on Magnetic Fields were developed specifically for AC fields, the Applicant calculated the magnetic fields from the DC portions of the Project in general accordance with the direction provided in those documents (*i.e.*, modeling was performed at WNC rating and assessed at height of 3.3 ft [1 m] above ground).

In addition to NYS, two international organizations provide limits on human exposure to magnetic fields to protect the health and safety of persons in an occupational setting and for the general public. The ICES which operates "under the rules and oversight of the Institute of Electrical and Electronics Engineers (IEEE) Standards Association Board," developed a maximum permissible exposure limit to magnetic fields of 9,040 mG for the general public (ICES 2002). The ICNIRP, an independent organization, provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation. The ICNIRP determined a reference level limit for whole-body exposure to 60 Hz magnetic fields of 2,000 mG (ICNIRP 2010). ICNIRP also recommends a limit of 4,000,000 mG for general public exposure to DC magnetic fields (ICNIRP 2009).

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[2] Some marine species have specialized anatomical features that allow them to detect very weak AC or DC electric fields. The Project, therefore included an evaluation of electric fields induced in seawater in order to compare to reported detection thresholds as described further in Section 4.8, 4.9 and 4.10 of this Exhibit. However, since these induced electric field levels would be approximately 1 million times below the NYSPSC limit, they are not included in this assessment.

4.13.2 Magnetic Field Modeling

The models used to calculate the magnetic field generated by the SRWEC–NYS and Onshore Transmission Cable (*i.e.*, the DC Project Cables) and the Onshore Interconnection Cable (*i.e.*, the AC Project Cable) are described below.

The magnetic fields around the OnCS-DC were not modeled as the highest magnetic-field levels around the perimeter of the facility will likely be due to the Onshore Transmission Cable and Onshore Interconnection Cable entering and exiting the substation. This is consistent with IEEE Standard 1127, which notes:

> In a substation, the strongest fields near the perimeter fence come from the transmission and distribution lines entering and leaving the substation. The strength of fields from equipment inside the fence decreases rapidly with distance, reaching very low levels at relatively short distances beyond substation fences (IEEE 2013).

SRWEC–NYS and Onshore Transmission Cable

Since the DC magnetic fields generated by the SRWEC–NYS and the Onshore Transmission Cable are combined with the Earth's geomagnetic field by vector addition, the relative orientation of these two fields changes the resulting combined field. The value of the total geomagnetic field near the center of the SRWEC–NYS and Onshore Transmission Cable corridors were estimated from the International Geomagnetic Reference Field (IGRF-13) Model[3] as 506 mG. Further details are included in Attachment B of Revised Appendix 4-J. To calculate DC magnetic-field strength generated by the SRWEC–NYS and the Onshore Transmission Cable, the static magnetic field from DC transmission is calculated by the application of the Biot-Savart Law, which is added to the earth's geomagnetic-field by vector to obtain the total magnetic field. Calculations were performed for WNC rating.

Evaluating how much the local static magnetic field changes direction as a result of the SRWEC-NYS is another way to describe the effect of the DC cable on the local environment. A compass needle typically points along the direction of the horizontal component of earth's geomagnetic field, but a new DC magnetic-field source may cause a local deviation in the apparent direction of magnetic north. This deviation was calculated as the compass deflection, which is the difference in angular direction in degrees between the horizontal component of the ambient geomagnetic field and the horizontal component direction of the combined geomagnetic field from the earth and the DC field from the SRWEC-NYS and the Onshore Transmission Cable.

3 https://ccmc.gsfc.nasa.gov/modelweb/models/igrf_vitmo.php

Onshore Interconnection Cable

The magnetic field for the Onshore Interconnection Cable was calculated using two-dimensional finite element analysis models, including the effects of ground continuity conductors (GCC) as calculated using the commercial software package COMSOL MultiPhysics Version 5.5, as well as algorithms developed by the Bonneville Power Administration (BPA), an agency of the US Department of Energy (USDOE). Magnetic-field levels were calculated by assuming the WNC rating on the Onshore Interconnection Cable.

4.13.3 Potential EMF Impacts and Proposed Mitigation

This section details potential impacts from EMF generated during the construction and operation phases of the Project.

Potential Construction Impacts and Proposed Mitigation

There are no anticipated EMF impacts during construction of the Project. The electrical equipment associated with the OnCS–DC nor the Project's transmission cables will not be energized until the entire Project is operable, as such EMF mitigation is not proposed during construction.

Potential Operational Impacts and Proposed Mitigation

Electric fields that are created from the voltage applied to the conductors within the cables will not be a direct source of any electric field above ground as the SRWEC–NYS, Onshore Transmission Cable and Onshore Interconnection Cable will be buried underground and will be shielded by the conductive sheaths in the design of the cable and the ground itself. Therefore, no electric field mitigation is proposed.

As described previously, the AC and DC magnetic fields associated with the operation of equipment within the OnCS-DC were not evaluated, as fields from this source are expected to be less than the Onshore Transmission Cable and Onshore Interconnection Cable.

SRWEC-NYS

The Applicant conducted an assessment of magnetic fields from the SRWEC–NYS (Revised Appendix 4-J). The SRWEC–NYS consists of two cables strapped together and will be buried beneath the seabed in a trench where they may lay either side-by-side or with one on top of the other.

The maximum calculated magnetic field deviation for the SRWEC-NYS at 3.3 ft (1 m) above the seabed over the SRWEC-NYS was 142 mG from the SRWEC-NYS (see Table 1 in Revised Appendix 4-J). The highest calculated total magnetic field, reflecting the contribution from the ambient geomagnetic field of 506 mG and a maximum increase of 142 mG from the SRWEC-NYS is 648 mG at 3.3 ft (1 m) above the seabed over the SRWEC-NYS. The calculated magnetic-field deviations decrease rapidly with distance from the centerline to ±45 mG at a distance of 10 ft (3 m) from the cable centerline. Calculated DC magnetic-field deviations from the SRWEC–NYS at a minimum assumed edge-of-ROW distance of ±10 ft (3 m) from the cable centerline are less than 200 mG (and are well below the ICES and ICNIRP exposure limits). The NYSPSC limit for AC magnetic field levels at the edge of the right-of-way is 200 mG.

The maximum computed compass deviations at a height of 3.3 ft (1 m) above seabed are approximately 156 degrees directly over the buried SRWEC–NYS, but decrease to an absolute value of approximately 12 degrees or less within ±10 ft (3 m)(see Attachment C of Revised Appendix 4-J).

Onshore Transmission Cable

The Applicant conducted an assessment of the magnetic fields from the Onshore Transmission Cable (Revised Appendix 4-J). The Onshore Transmission Cable will consist of 2 cross-linked polyethylene (XLPE) cables each installed in a separate 8-in (20-cm) polyvinyl chloride (PVC) conduit within an underground duct bank buried 3 ft (0.9 m) below surface grade with short portions of the route installed in a direct bury configuration and so both installation methods were modeled.

Modeling results for the Onshore Transmission Cable installed in duct banks showed the highest calculated magnetic field at 3.3 ft (1 m) above ground was 422 mG with a total calculated magnetic field of 928 mG, inclusive of the ambient geomagnetic field of 506 mG and a maximum change of 422 mG from the DC cables when the DC duct bank is installed in an east-west direction, which occurs where the Onshore Transmission Cable follows the South Service Road. The maximum calculated magnetic-field deviation at a distance of ±10 ft (±3 m) decreases to 110 mG and to 32 mG at a distance of ±25 ft (±7.6 m) from the duct bank centerline (see Table 2 in Revised Appendix 4-J).

Elsewhere along the Onshore Transmission Cable corridor, the DC fields are calculated to reduce the ambient geomagnetic field to a minimum of 101 mG, which reflects the contribution from the ambient geomagnetic field of 506 mG and a maximum change from the DC cables of 405 mG, but with the opposite polarity (*i.e.*, -405 mG). These maximum deviations occur close to the duct bank and decrease rapidly with distance, decreasing to 54 mG at a distance of ±10 ft (±3 m) and 19 mG at a distance of ±25 ft (±7.6 m) from the duct bank centerline.

Where the Onshore Transmission Cable is installed via direct bury, the DC magnetic-field levels (and deviations) are much lower due to the greater burial depth, and a maximum deviation is calculated of approximately 78 mG relative to the earth's ambient geomagnetic field (see Table 2 in Revised Appendix 4-J).

Calculated DC magnetic-field deviations from the Onshore Transmission Cable (either duct bank or direct bury installation) at a minimum assumed edge-of-ROW distance of ±10 ft (±3 m) from the cable centerline are less than 200 mG (and are well below the ICES and ICNIRP exposure limits). The NYSPSC limit for AC magnetic field levels at the edge of the ROW is 200 mG. No magnetic field mitigation is proposed for the Onshore Transmission Cable.

Computed compass deviations at a height of 3.3 ft (1 m) above ground are 133 degrees or less directly above the DC duct bank decreasing to 41 degrees, and 4.7 degrees at ±10 ft (±3 m) and ±25 ft (±7.6 m) from the centerline, respectively. Maximum deviations over the DC direct bury configuration at a height of 3.3 ft (1 m) above ground were far lower. Given the ubiquity of navigation systems that do not rely on the earth's geomagnetic field and the proposed location of the Onshore Transmission Cable, a local deviation of a few degrees for such a short distance would not likely interfere with navigational purposes (see Attachment C of Revised Appendix 4-J).

Onshore Interconnection Cable

The Applicant conducted an assessment of the magnetic fields from the Onshore Interconnection Cable (Revised Appendix 4-J). The 138 kV AC Onshore Interconnection Cable will be installed in twin duct banks, separated by an edge-edge distance of 15 ft (4.6 m). Each duct bank will consist of 6 single-core XLPE cables (2 for each phase) each installed in separate 8-in (20-cm) PVC conduits.

Modeling results for the Onshore Interconnection Cable showed the calculated magnetic-field level decreases with distance from the individual duct banks. The calculated magnetic-field at a height of 3.3 ft (1 m) directly above the Interconnection Cable was 65 mG, decreasing to 63 mG at a distance of ±10 ft (±3 m) and 21 mG at a distance of ±25 ft (±7.6 m) from the duct bank centerline (see Table 3 in Revised Appendix 4-J). The maximum calculated AC magnetic-field level at a height of 3.3 ft (1 m) at the edge of the ROW (conservatively assumed to be ±10 ft [±3 m]) complies with the 200 mG limit for AC magnetic fields set by the NYSPSC (and are well below the ICES and ICNIRP exposure limits), and therefore no magnetic field mitigation is proposed for the Onshore Interconnection Cable.

4.14 AIR QUALITY

This section describes the existing conditions related to air resources and potential air emissions from the construction and operation of the Project. The discussion of the existing air quality conditions is followed by an evaluation of potential Project-related impacts based on the projected emissions and a description of the environmental protection measures that the Applicant will implement to avoid, minimize, and mitigate potential impacts to air quality. The SRWF and this Project will provide clean, reliable offshore wind energy that will increase the amount and availability of renewable energy to NYS while creating the opportunity to displace electricity generated by fossil fuel-powered plants that emit air pollutants and greenhouse gases. Thus, the SRWF and this Project will provide a net benefit in terms of air quality.

The description of the existing conditions and assessment of potential impacts to air quality were developed by reviewing current federal and NYS air quality regulations applicable to the Project and public data sources related to air quality, including online mapping databases (*e.g.*, EPA's Green Book), and consultation with air permitting staff at EPA.

The Clean Air Act (CAA) requires the EPA to identify air pollutants that pose a risk to public health and welfare and to set standards indicating the permissible air concentration of each pollutant. The EPA has identified six pollutants of concern: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). These six pollutants (CO, Pb, NO_2, O_3, PM and SO_2) are referred to as “criteria pollutants” since the EPA develops criteria, or science-based guidelines, for these pollutants when it sets standards. O_3 is not emitted directly into the air but is created by chemical reactions in the atmosphere between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Primary PM is emitted directly into the atmosphere by anthropogenic activities that stir up dust from the ground or create smoke and ash through combustion (*e.g.*, vehicle exhaust), while secondary PM is formed in the atmosphere as a result of chemical reactions between gaseous emissions such as SO_2 and NO_2. The EPA sets primary and secondary standards called National Ambient Air Quality Standards (NAAQS) for the pollutants, which are summarized in Table 4.14-1. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The EPA reviews the NAAQS every five years and may update the standards based on new scientific information.

Table 4.14-1. National Ambient Air Quality Standards for Criteria Pollutants

Criteria Pollutant	Primary/Secondary	Averaging Time	Standard	
			Concentration	Form
CO	Primary	8 hours	9 parts-per-million (ppm)	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb	Annual mean
NO_2	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb	Annual mean

Criteria Pollutant	Primary/Secondary	Averaging Time	Standard	
			Concentration	Form
O_3	Primary and Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8 hour concentration, averaged over 3 years
$PM_{2.5}$	Primary	1 year	12 microgram/cubic meter (µg/m^3)	Annual mean, averaged over 3 years
	Secondary	1 year	15 µg/m^3	
	Primary and Secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2	Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

In an effort to achieve and maintain the federal standards, each state is required to monitor the ambient air to determine whether the state or area is in compliance with the NAAQS. Therefore, baseline air quality conditions are typically evaluated by comparing the ambient concentration of a criteria pollutant, as measured at the nearest air monitoring station, to the NAAQS to determine whether the ambient concentration is in exceedance of any of the criteria pollutant standards.

Based on the monitoring data, the EPA designates a state's individual counties and multi-county metropolitan areas as in nonattainment, attainment, or maintenance for the standard. Nonattainment means that the county and/or area is not meeting the standard, while attainment means that it is. Maintenance means that it has only recently begun to meet the standard and must continue to provide the EPA with information showing that it is maintaining the standard before the area can qualify for re-designation as in attainment. Certain areas that cannot be designated as either in attainment or in nonattainment based on available information are considered to be "unclassifiable," and such areas are typically treated as in attainment. For each area that is designated as in nonattainment, state air quality management agencies must develop a State Implementation Plan (SIP) to attain the standard. The SIP includes regulations for reducing emissions of the pollutant, quantifying the levels of emissions from various sources, and permitting emissions sources.

Hazardous Air Pollutants and Greenhouse Gases

In addition to the criteria pollutants discussed above, air pollutants can be categorized as Hazardous Air Pollutants (HAPs) or greenhouse gases (GHGs). HAPs, also known as toxic air pollutants or air toxics, are those pollutants known or suspected to cause cancer or other serious health impacts, such as reproductive impacts or birth defects, or adverse environmental impacts (EPA 2017). Examples of HAPs include benzene (found in gasoline), dioxin, asbestos, toluene, cadmium, mercury, and chromium.

There are no federal ambient air quality standards for HAPs. Emissions of HAPs are regulated through the National Emission Standards for Hazardous Air Pollutants (NESHAPs) and permit requirements. The standards depend on the type of manufacturing activity and whether or not the regulated facility is a "major source," which is defined as a source that has actual or potential emissions of 10 tons per year or more of any specific HAP or 25 tons per year or more of any combination of HAPs.

GHGs are gases that trap heat in the atmosphere and include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. The largest source of GHG emissions from human activities in the US is from burning fossil fuels (mostly coal and natural gas) for electricity, heat, and transportation. There are no federal ambient air quality standards or emission standards for GHGs.

4.14.1 Existing Air Quality

NYSDEC operates a network of more than 50 air monitoring stations throughout NYS, including 4 located in Suffolk County, that measure ambient concentrations of criteria pollutants, HAPs, and ozone precursors, which are substances that react in the atmosphere to form ground-level ozone.

Per the EPA's Monitor Values Report (MVR), concentrations of diesel HAPs in NYS have been generally decreasing over the last 10 years (EPA n.d.). Other than acetaldehyde, the 10-year concentrations of the HAPs were at their highest in 2009 and their lowest in 2014. The reported concentrations since 2014 are slightly higher but are generally steady.

Per the 2019 NYS Greenhouse Gas Inventory, emissions of GHGs in NYS in 2016 have been estimated at 205.6 million metric tons of CO_2 equivalent (CO_2e), which is the amount of CO_2 that would produce the same increase in global temperatures as the total of all GHGs emitted in 2016 (NYSERDA 2019).

This is on target to meet NYS's CLCPA which was signed in July 2019 and adopts the most ambitious and comprehensive climate and clean energy legislation in the country. The CLCPA sets forth an ambitious plan that sets the NYS's goals of achieving 100 percent carbon-free electricity by 2040 and 70 percent of electricity from renewable sources by 2030, including a target of reaching 9,000 MW of offshore wind by 2035. Further, the CPCLA sets forth a target of an 85 percent reduction in GHG emissions from 1990 levels by 2050 (NYS 2020).

4.14.2 Potential Air Quality Impacts and Proposed Mitigation

This section identifies and evaluates the potential construction and operational impacts of the Project to air quality.

Potential Construction Impacts and Proposed Mitigation

Construction of the Project will require construction equipment, vessels, and vehicles that are expected to emit (or have the potential to emit) air pollutants. Construction activities that will utilize primarily diesel-powered equipment, vessels, and vehicles include cable installation, HDD operations, trenching/duct bank construction, and cable pulling and termination.

During construction of the SRWEC–NYS, there will be air emissions from marine vessels, on-vessel equipment, and onshore equipment used for the construction of the SRWEC–NYS and the construction of Onshore Facilities; as well as offshore vessels transiting through NYS waters during the construction phase of the SRWF. Construction-related emissions from vessels and portable diesel generators will be temporary and will cease when construction is completed.

During construction of the Onshore Transmission Cable, OnCS–DC, and Onshore Interconnection Cable there will be a variety of road and non-road engines in use that will produce emissions. Construction-related emissions associated with these engines during construction of the Onshore Facilities will be temporary and will cease when construction is completed.

Air emissions during construction will be minimized by using low-sulfur fuels where possible and limiting engine idling time. Further, Onshore Facilities equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards. Additionally, equipment, vessels, and vehicles will be maintained per industry standards, have appropriate mufflers and air filters, and kept in working order throughout Project construction.

In addition to air emissions, a localized increase in fugitive dust may result during onshore construction activities. Dust will be controlled by utilizing appropriate dust suppression BMPs, such as mulch, water sprinkling, and wind barriers. Further information on dust control measures will be detailed in the SWPPP prepared as part of the Project EM&CP.

Potential Operational Impacts and Proposed Mitigation

Potential impacts from operation of the Project are expected to be minimal. During the operation phase, the Project will generate few emissions from infrequent use of equipment engines, vessels, and vehicles, resulting in temporary and localized impacts to air quality during non-routine maintenance. Measures to minimize air emissions during Project operations will be the same as discussed for the construction phase. Moreover, the use of wind to generate electricity reduces the need for electricity generation from traditional fossil fuel power plants, which produce GHGs. Thus, the SRWF and Project will provide a net benefit in terms of air quality.

Proposed Environmental Protection Measures

The Applicant will implement the following environmental protection measures to reduce potential impacts on air quality. These measures are based on protocols and procedures successfully implemented for similar projects:

- Air emissions during construction will be minimized by using low-sulfur fuels where possible and limiting engine idling time.
- Onshore Facilities equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards.
- Equipment, vessels, and vehicles will be maintained per industry standards, have appropriate mufflers and air filters, and kept in working order throughout Project construction.
- Dust will be controlled by utilizing appropriate dust suppression BMPs, such as mulch, water sprinkling, and wind barriers. Further information on dust control measures will be detailed in the SWPPP prepared as part of the Project EM&CP.

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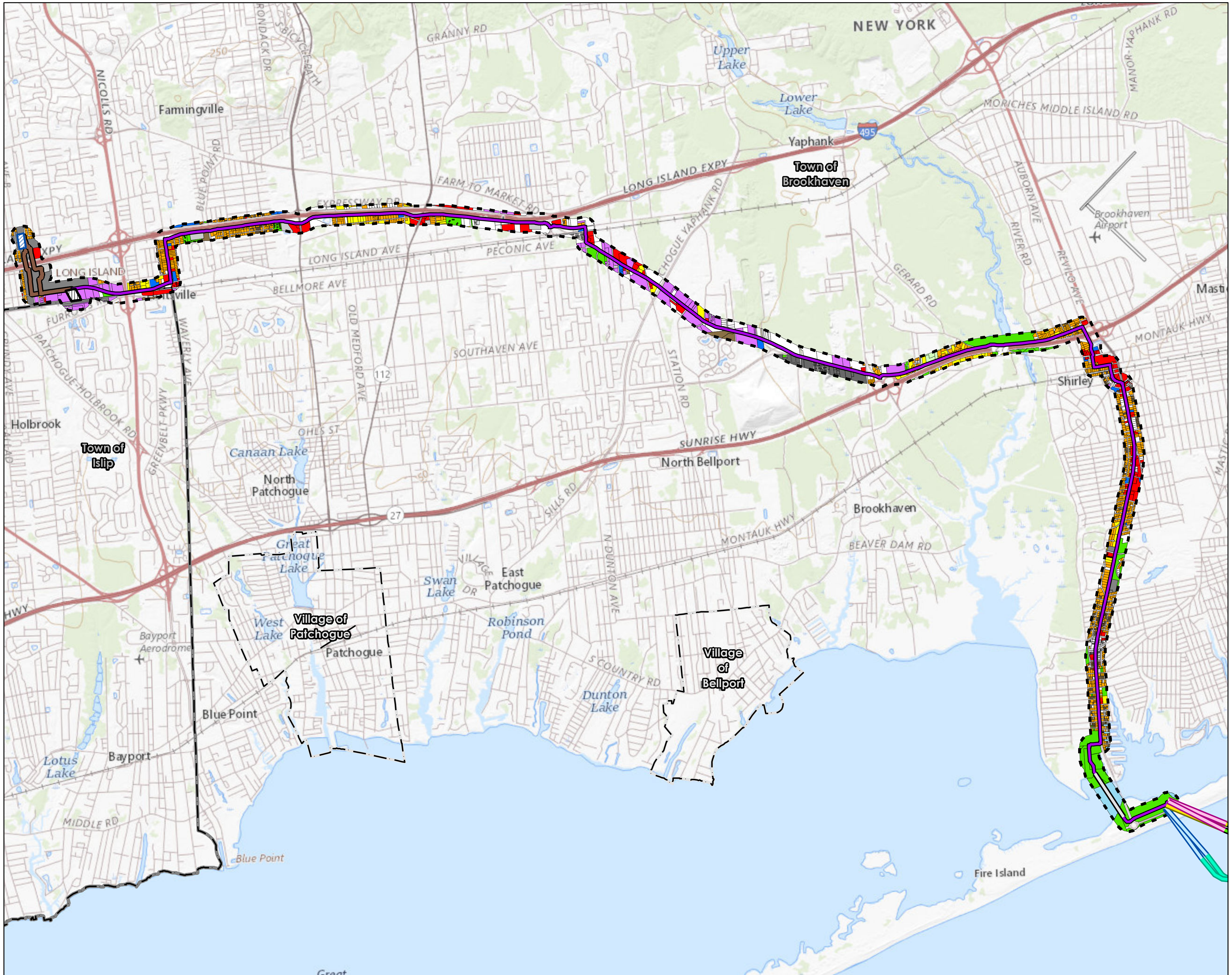


Revised Figure 4.2-1
Existing Land Uses

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Village Boundary
- Town Boundary

Land Use

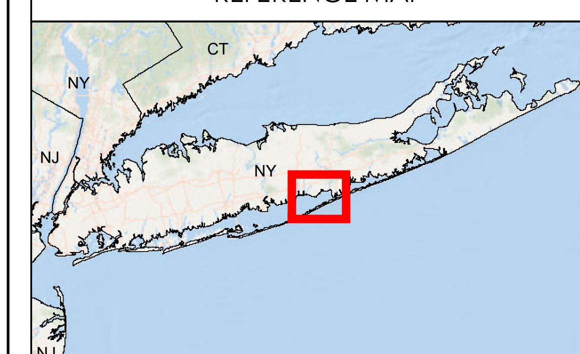
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Recreation & Open Space
- Agriculture
- Vacant
- Transportation
- Utilities
- Waste Handling & Management
- Surface Waters

Sources
Suffolk County Dept of Economic Development & Planning, 2016 NYS Office of IT Services GPO, NYS Boundaries, 2018 USGS Topo Map
Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 1 mile
0 1.5 km
N
Scale at 11x17: 1:63,360
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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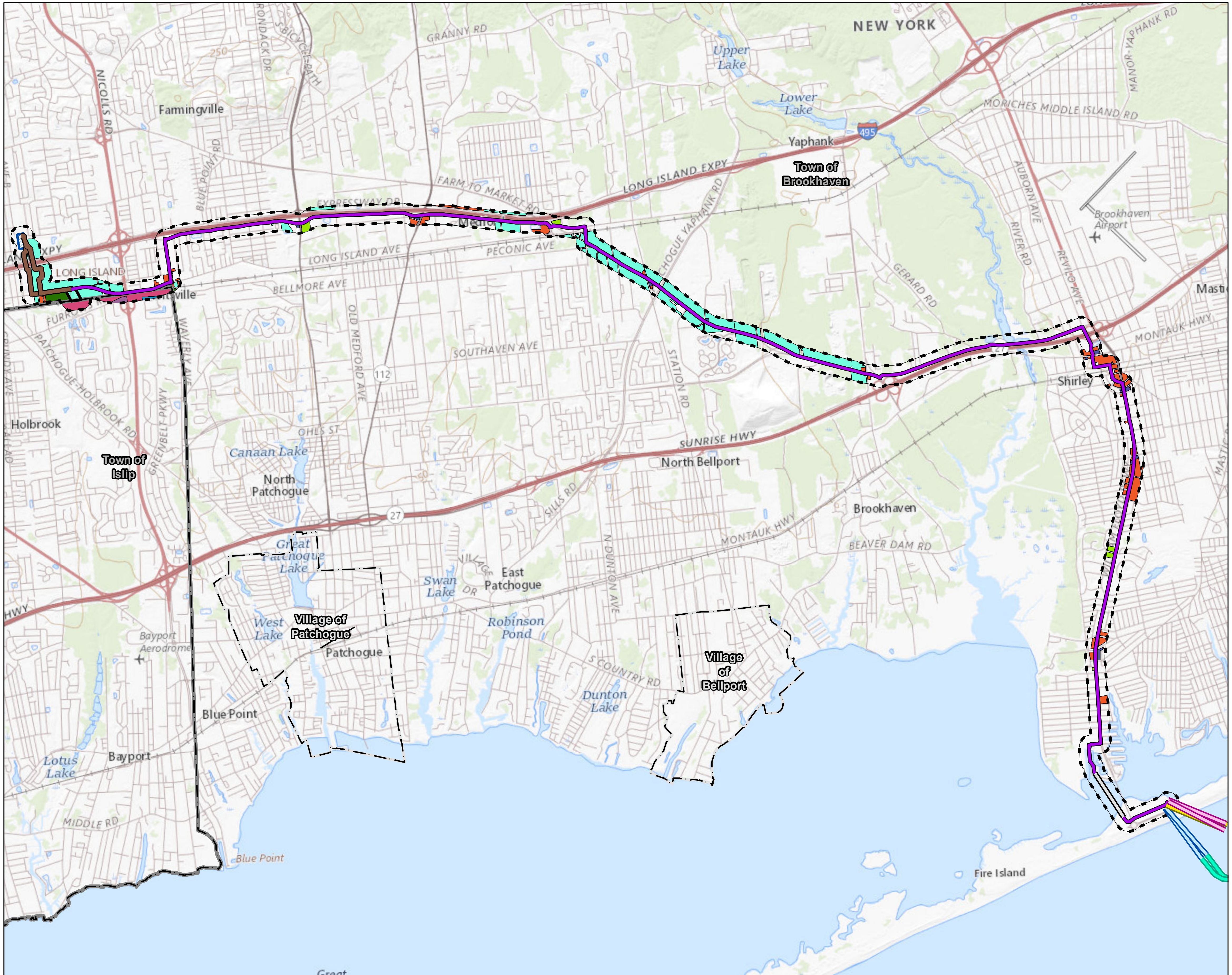

Revised Figure 4.2-2
Zoning Districts

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Town Boundary
- Village Boundary

Zoning District

- AA
- CA
- IND1 (Town of Islip)
- J2
- J4
- J5
- L1
- L2
- Residental Zoning (A10, A5, A2, A1, A, B1, B, C, D, or RD)

Sources
Suffolk County Department of Economic Development and Planning, 2016
NYS Office of IT Services GPO, NYS Boundaries, 2018
TNC, Compiled Zoning Boundaries Suffolk County, 2019

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 1 mile
0 1.5 km
N
Scale at 11x17: 1:63,360
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP

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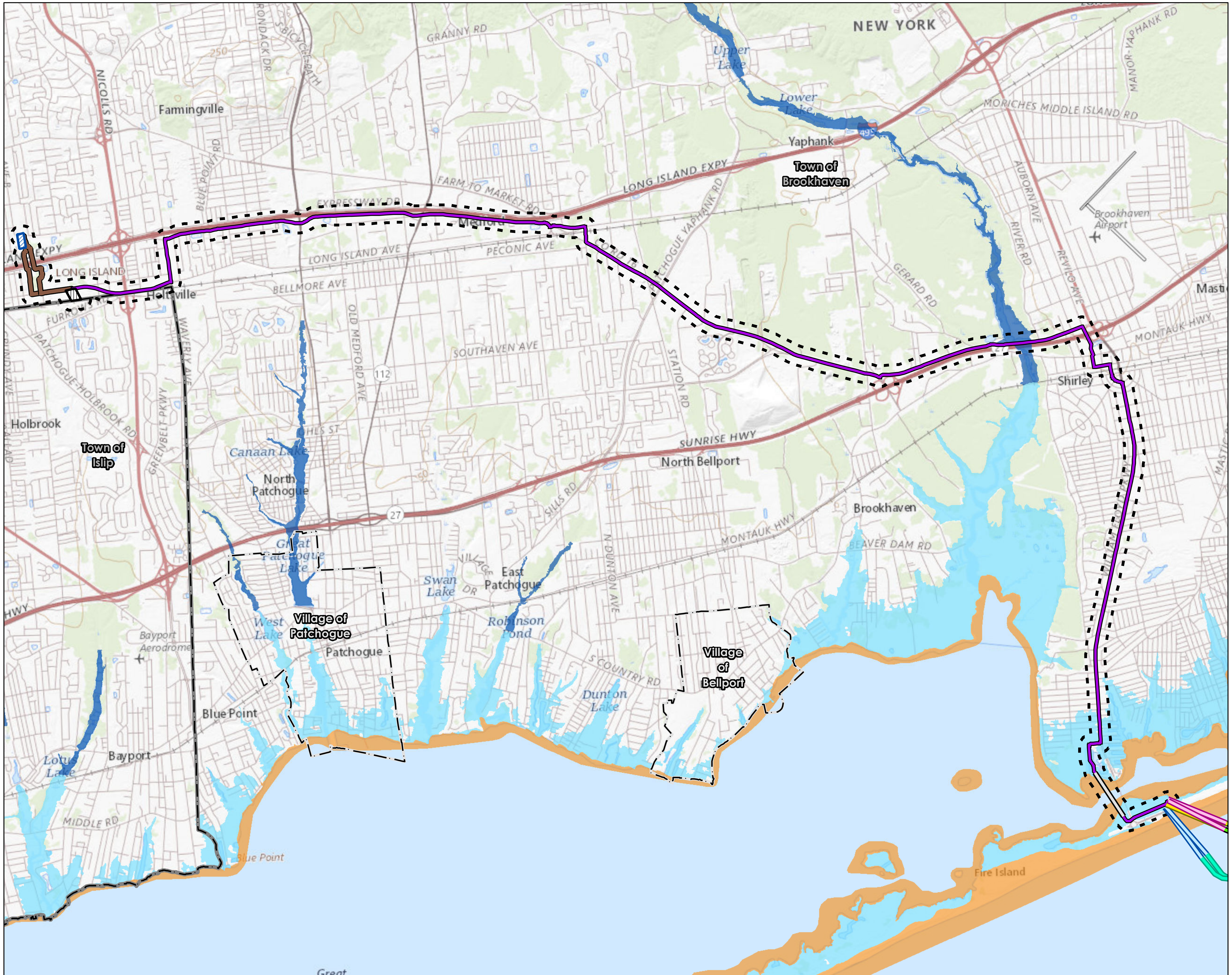


Revised Figure 4.2-3
Floodplains

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Village Boundary
- Town Boundary

Federal Emergency Management Agency (FEMA) Flood Zone

- Zone A
- Zone AE
- Zone VE

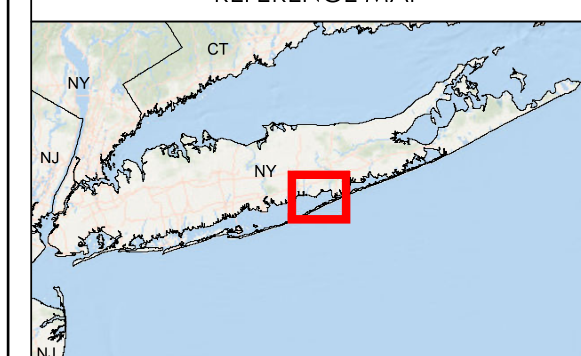
Sources
FEMA NFHL Eastern Long Island, 2020
NYS Office of IT Services GPO, NYS Boundaries, 2018 USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

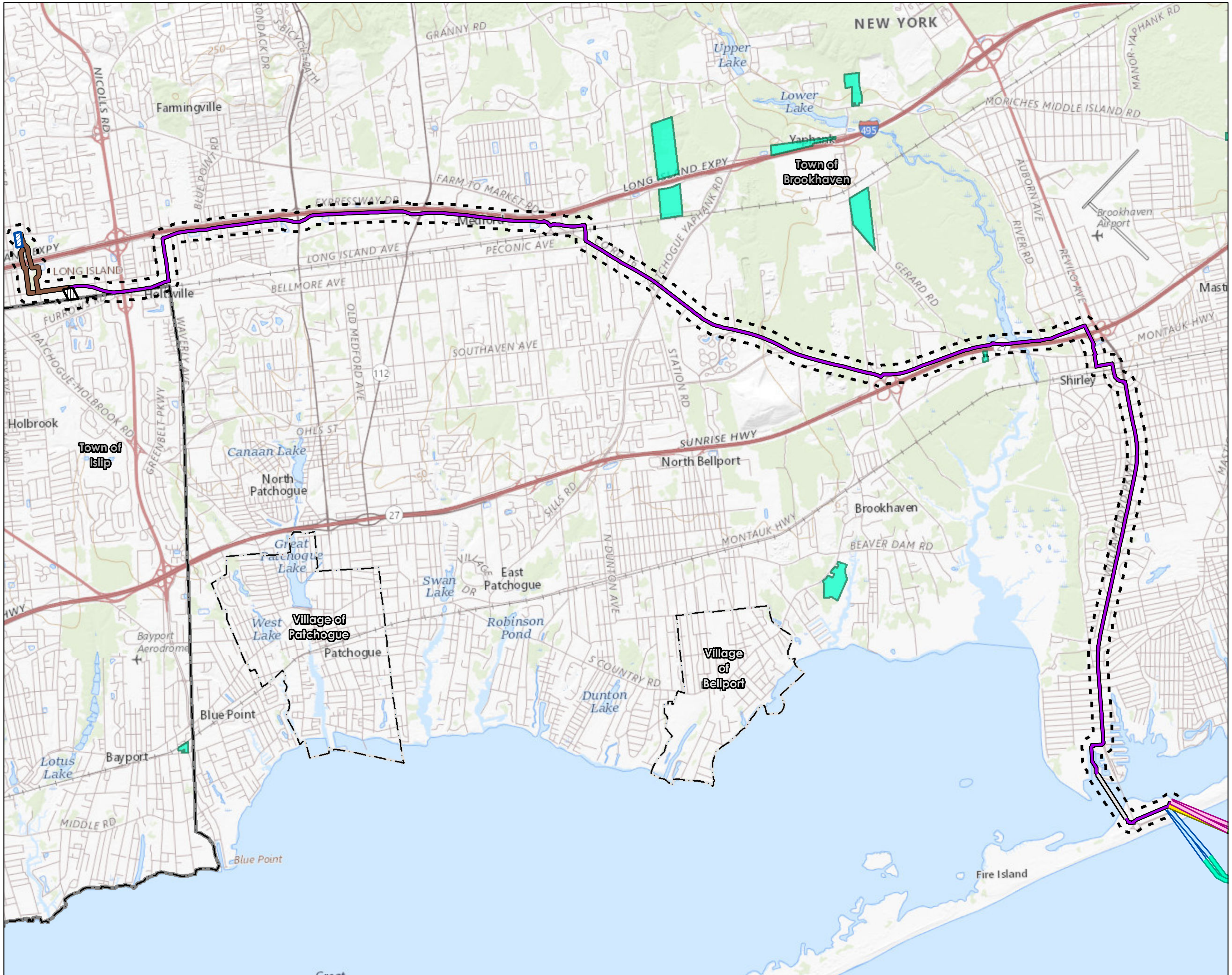
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 1 mile
0 1.5 km
N
Scale at 11x17: 1:63,360
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



Revised: 2021-03-29 By: gcarpentier



Revised Figure 4.2-4
Agricultural Districts

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Village Boundary
- Town Boundary
- Agricultural District 3

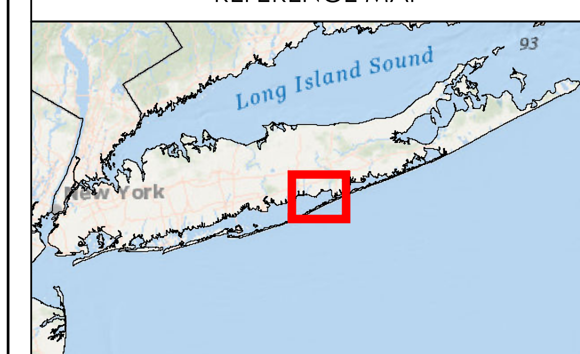
Sources
Cornell IRIS, NYS Dept. Agriculture & Markets, Suffolk County, 2010
NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 — 1 mile
0 — 1.5 km
N
Scale at 11x17: 1:63,360
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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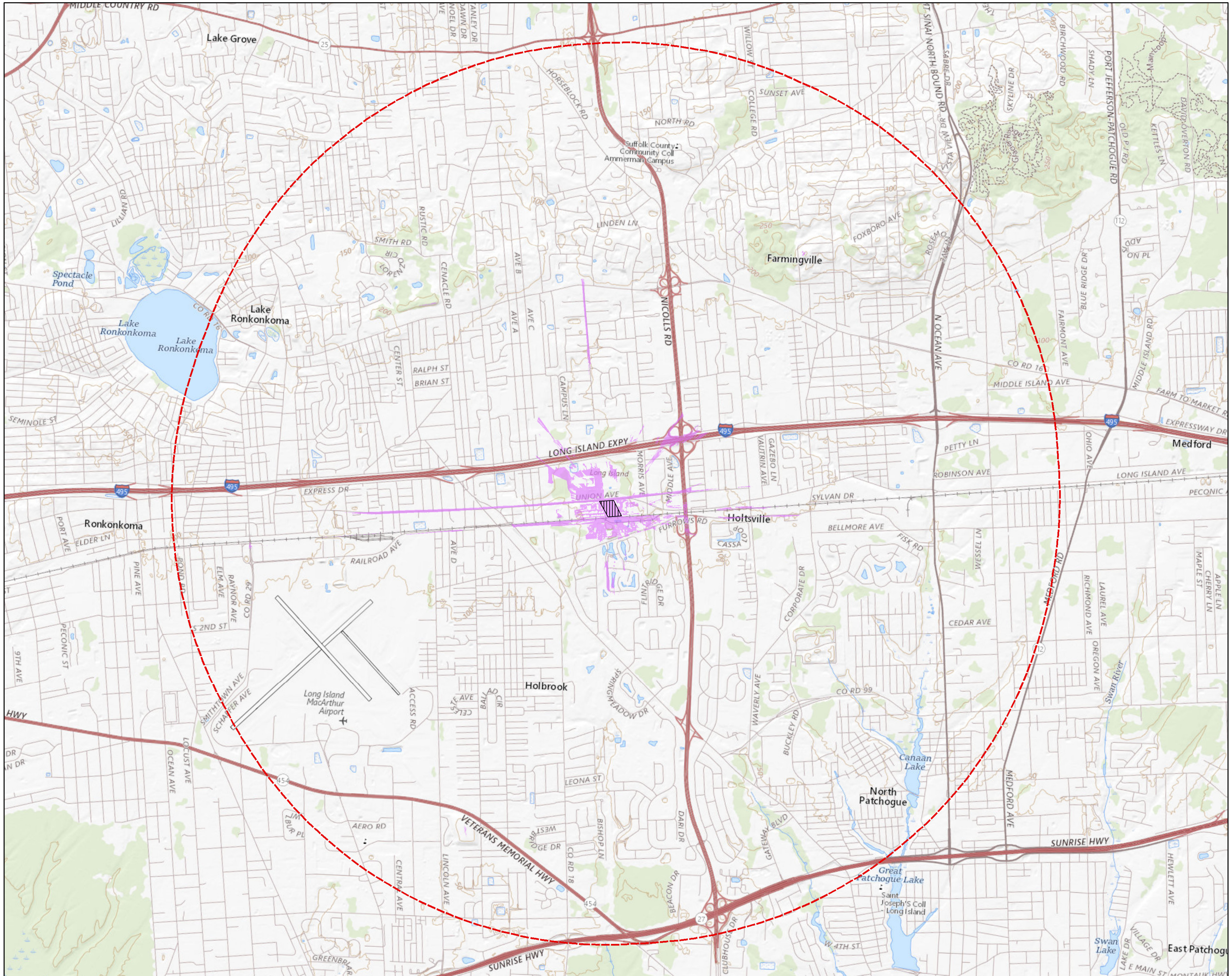


Revised Figure 4.3-1. Onshore Converter Station Visual Study Area and Zone of Visual Influence

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Converter Station (OnCS-DC) Zone of Visual Influence
- Union Avenue Site
- Onshore Converter Station (OnCS-DC) Visual Study Area

Sources

Notes: 1. Basemap: "USGS Topo Base Map" displayed via the USGS Topo Map Service. **2.** This map was generated in ArcMap on April 2, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

Date	03/23/2021
Project Number	2028113199
Prepared By	RCN
Reviewed By	GWP

0 1 Miles

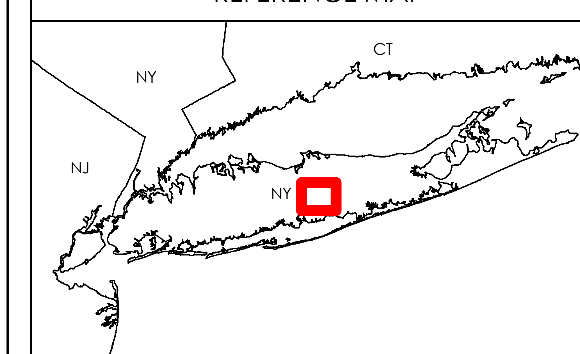
0 1 NM

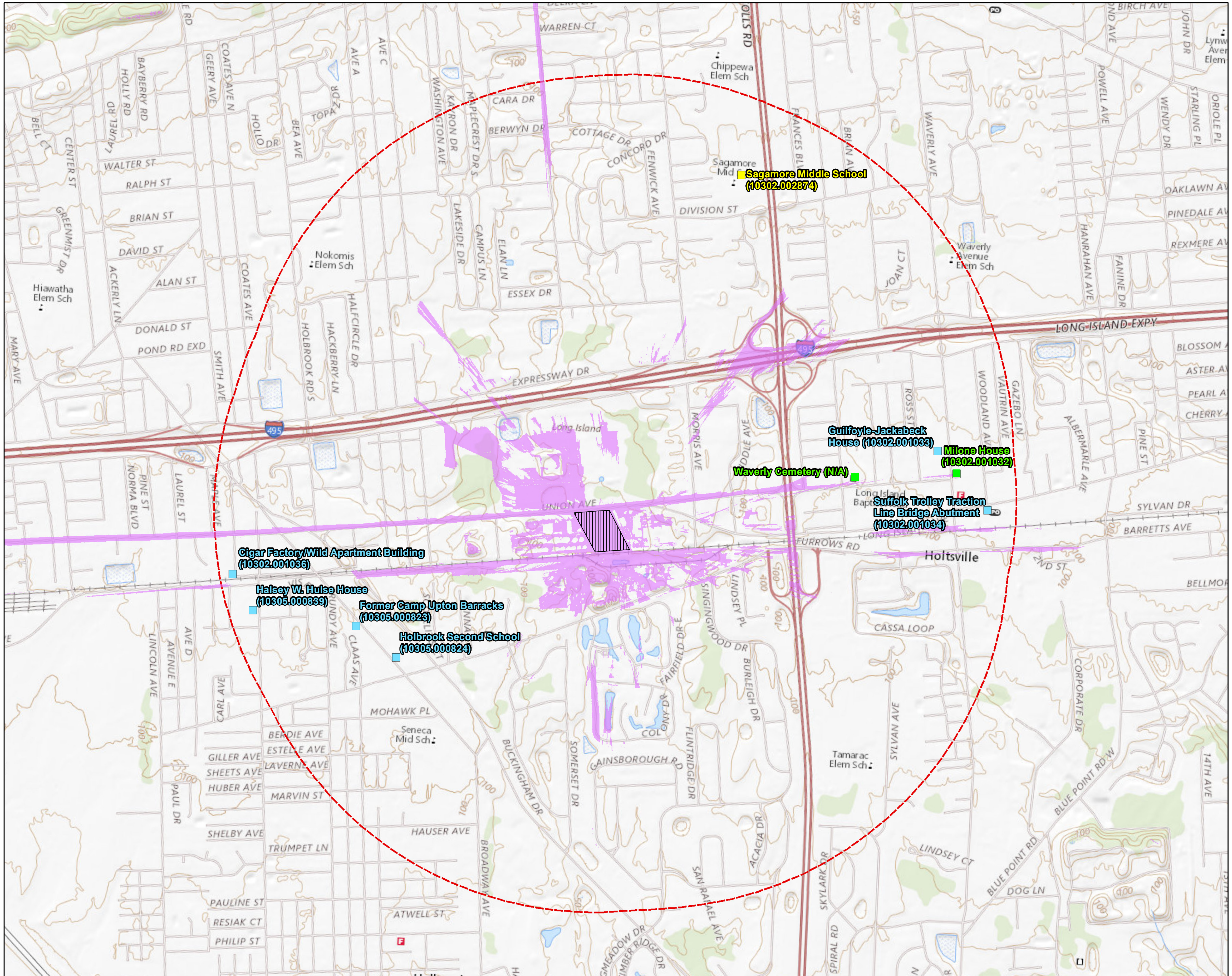
0 1 KM

N

Scale at 11x17: 1:45,000
NAD 1983 2011 UTM Zone 19N

REFERENCE MAP





Revised Figure 4.4-1
OnCS-DC
Historic Resources Study Area

Sunrise Wind | Powered by Ørsted & Eversource

Legend

Previously Identified Historic Property

- S/NRHP-Eligible Property (SHPO Determined); No Visibility
- S/NRHP Eligibility Undetermined; Potential Visibility
- S/NRHP Eligibility Undetermined; No Visibility
- Onshore Converter Station (OnCS-DC) Area of Potential Visibility
- Union Avenue Site
- OnSS-AC/OnCS-DC Historic Resources Study Area

Sources

Notes: 1. Basemap: "USGS Topo Base Map" displayed via the USGS Topo Map Service. **2.** This map was generated in ArcMap on April 2, 2021. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

Date	03/23/2021
Project Number	2028113199
Prepared By	RCN
Reviewed By	GSJ

0 0.25 Miles

0 0.25 NM

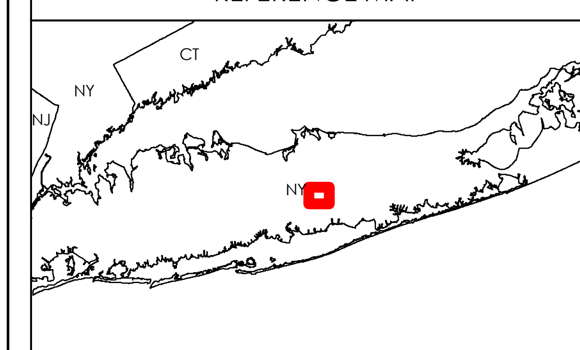
0 0.5 KM

N

Scale at 11x17: 1:17,787

NAD 1983 2011 UTM Zone 19N

REFERENCE MAP



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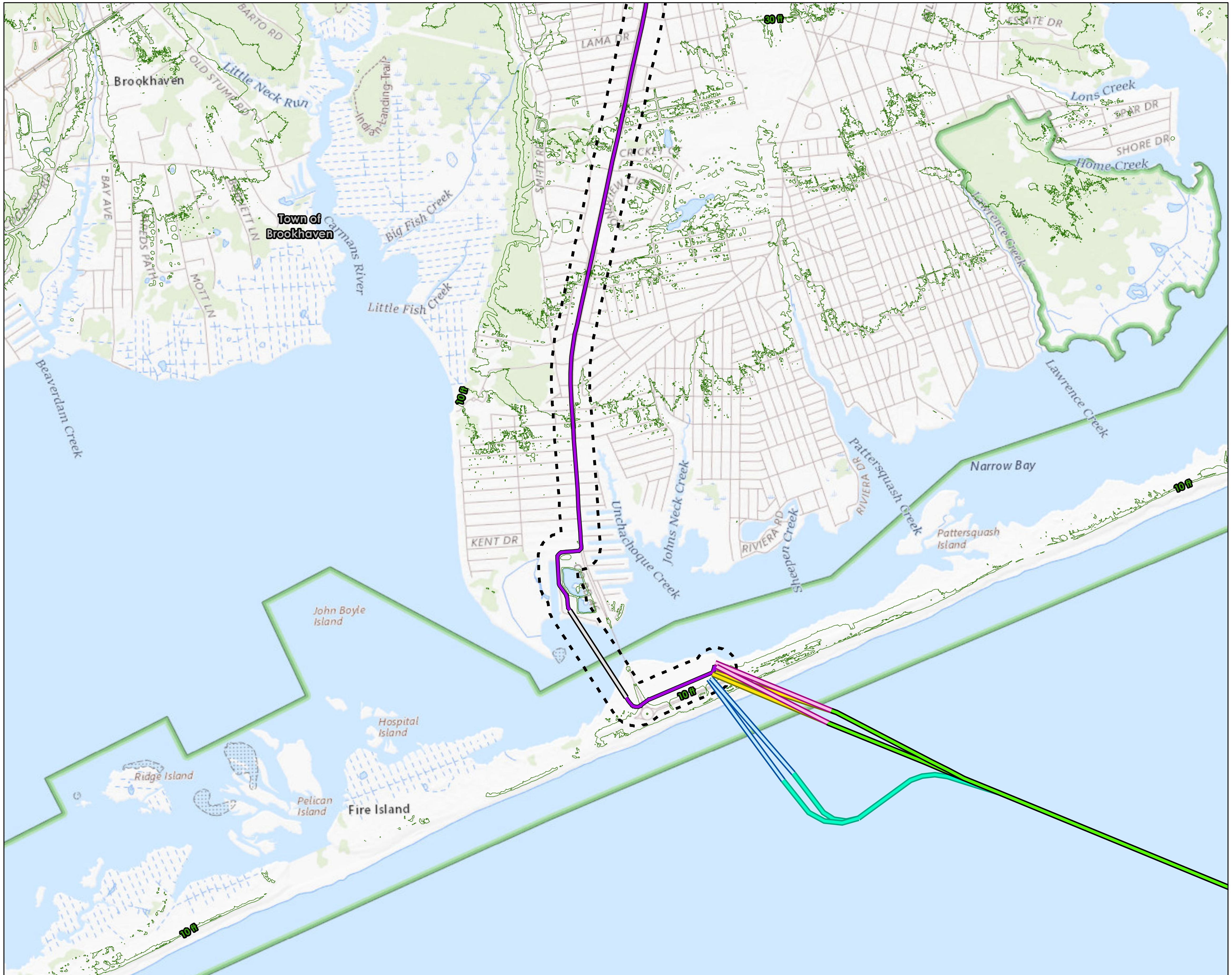


Revised Figure 4.5-1
Topography

Sunrise Wind Powered by Ørsted & Eversource

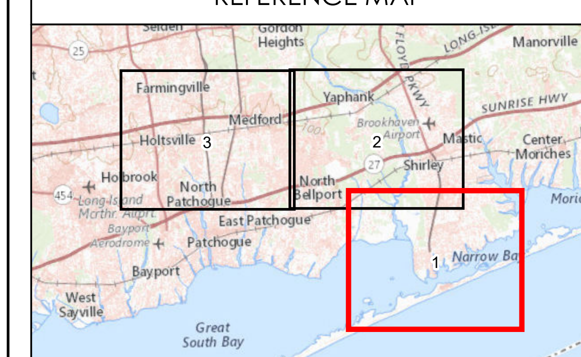
Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- 500 Feet from Project
- 10-ft Contours
- Village Boundary
- Town Boundary

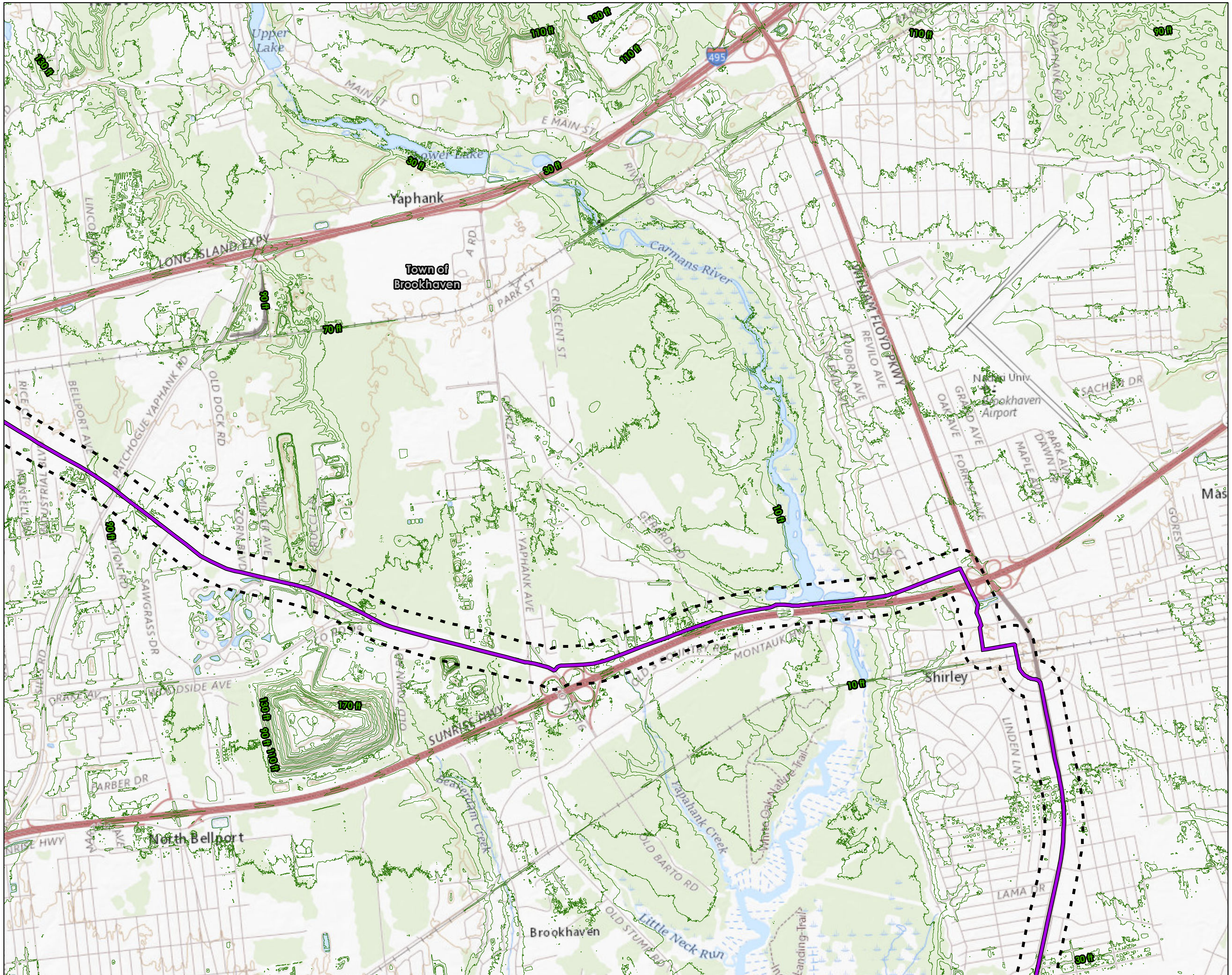
Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Contours Suffolk County, 2014
USGS Topo Map
Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP





Revised Figure 4.5-1
Topography

Sunrise Wind | Powered by Ørsted & Eversource

Legend
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USGS Contours Suffolk County, 2014
USGS Topo Map
Note
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Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

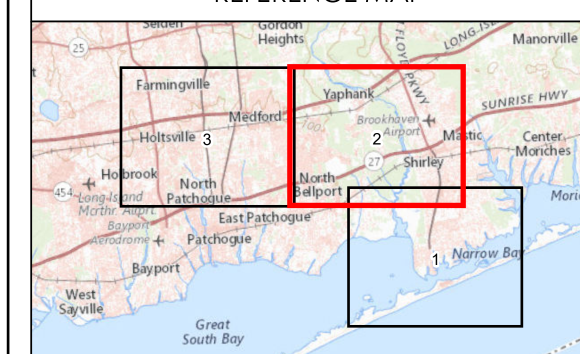
0 0.5 mile

0 0.75 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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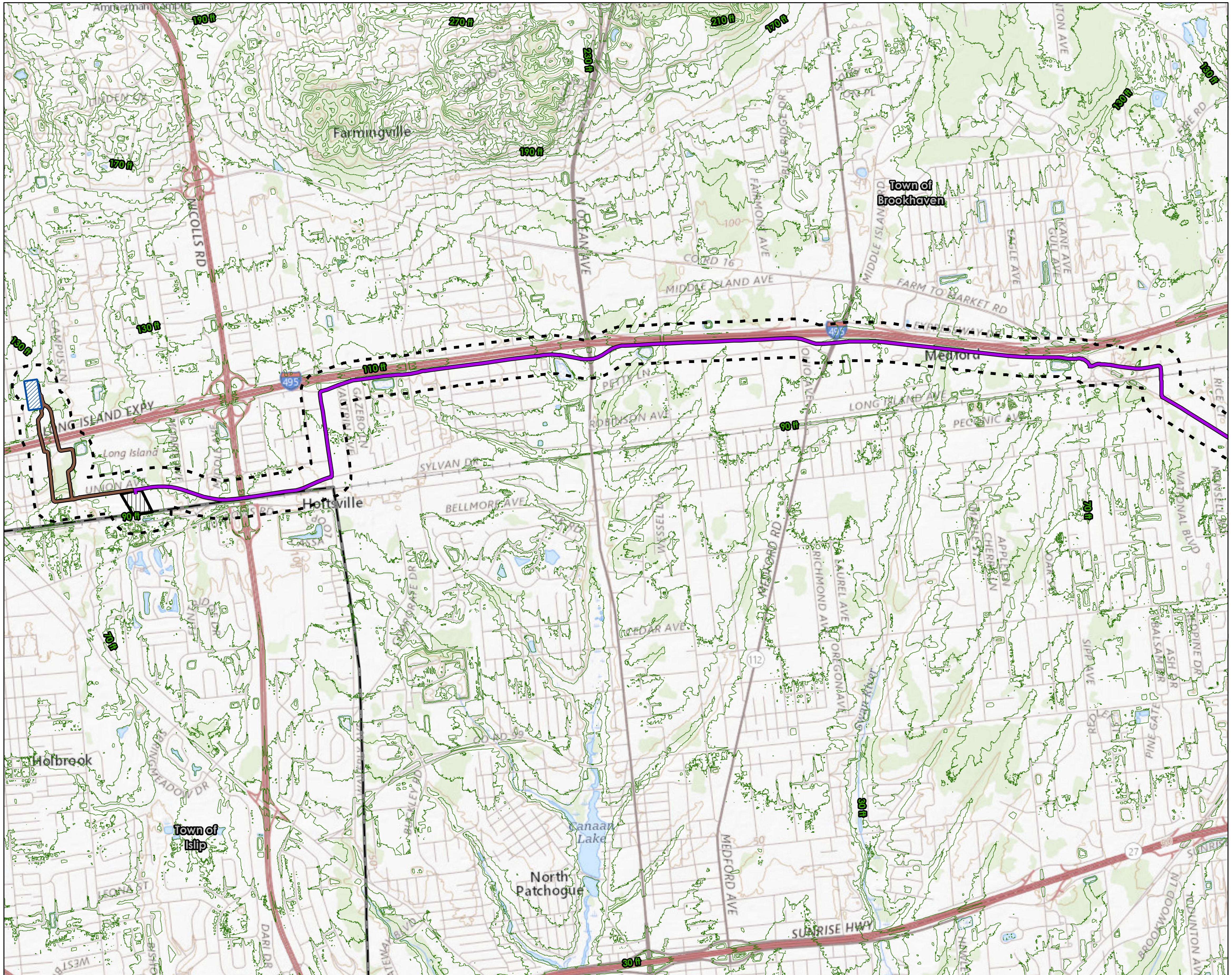

Revised Figure 4.5-1
Topography

Sunrise Wind | Powered by Ørsted & Eversource

Legend
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Sources
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USGS Contours Suffolk County, 2014
USGS Topo Map
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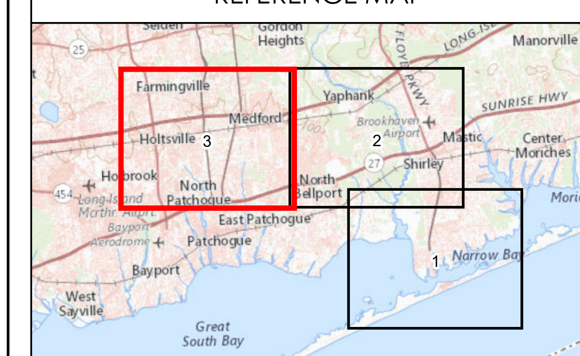
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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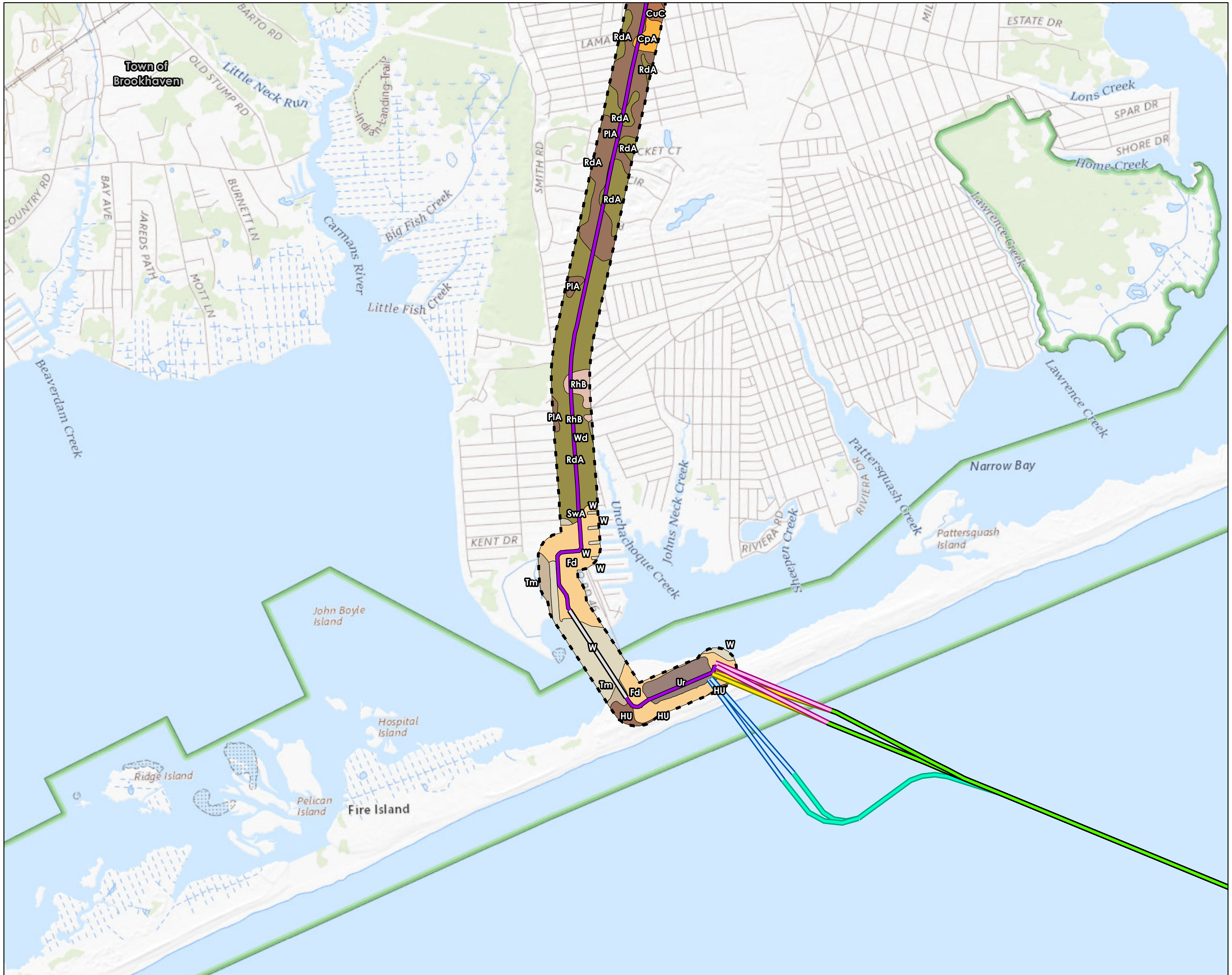


Revised Figure 4.5-2
Soil Classification

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- 500 Feet from Project
- Village Boundary
- Town Boundary

Soil Classification

At	Gp	RdB
CpA	HU	RdC
CpC	HaA	RhB
CpE	PIA	SwA
CuB	PIB	Tm
CuC	PIC	Ur
Fd	Rc	W
	RdA	Wd
		We

Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018
Soil Survey Geographic Database (gSSURGO), 2019
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

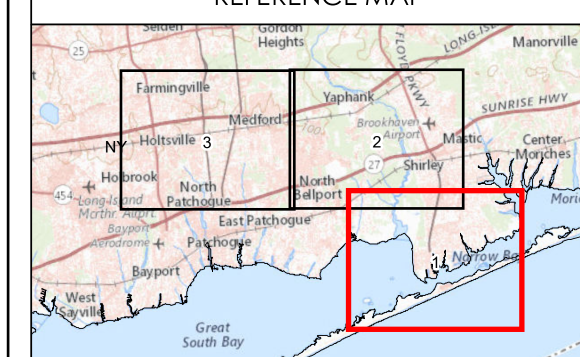
0 0.5 mile

0 0.75 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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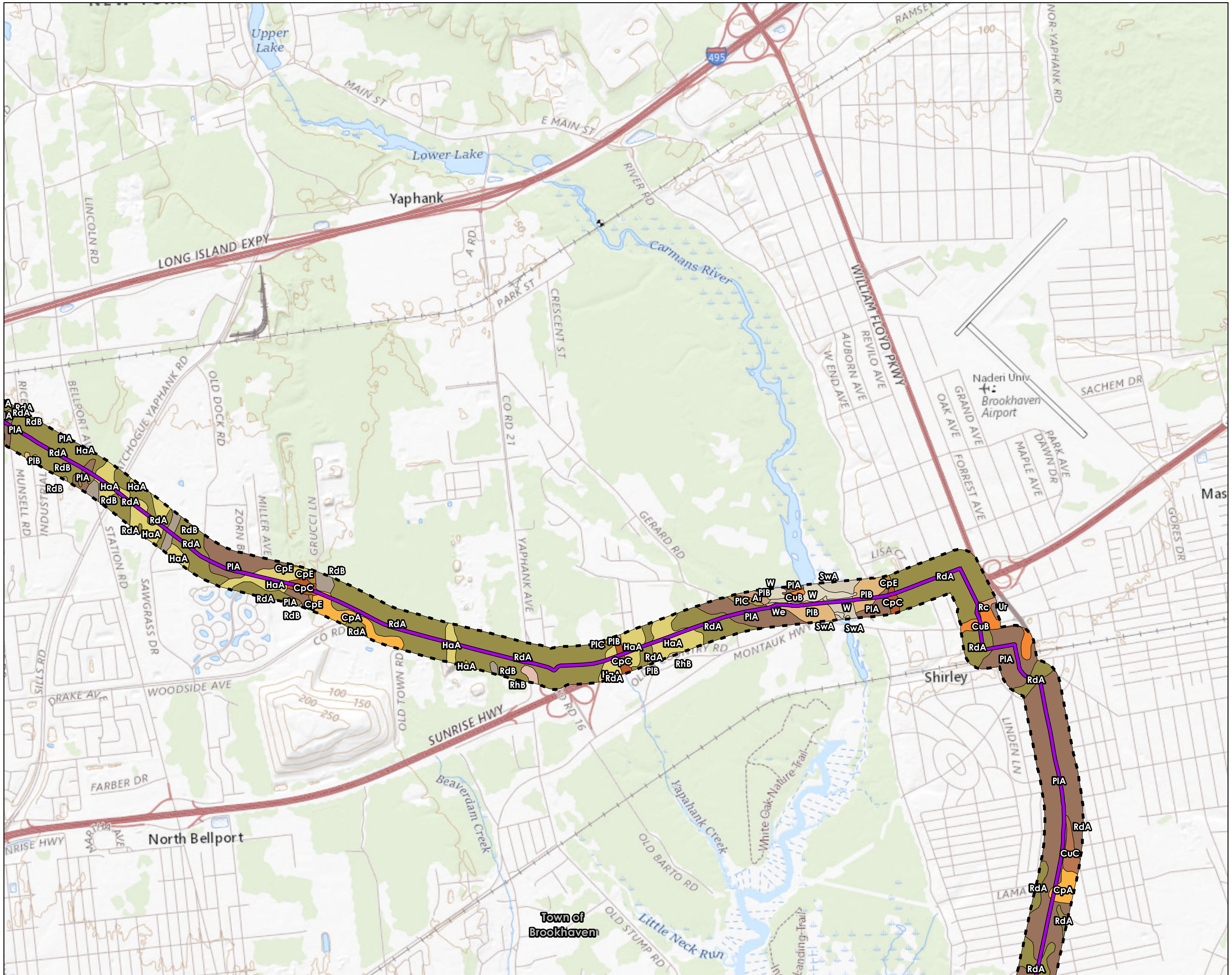


Revised Figure 4.5-2
Soil Classification

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- 500 Feet from Project
- Village Boundary
- Town Boundary

Soil Classification

At	Gp	RdB
CpA	HU	RdC
CpC	HaA	RhB
CpE	PlA	SwA
CuB	PlB	Tm
CuC	PlC	Ur
Fd	Rc	W
	RdA	Wd
		We

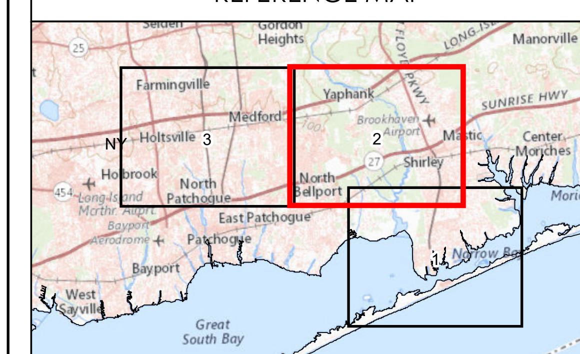
Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018
Soil Survey Geographic Database (gSSURGO), 2019
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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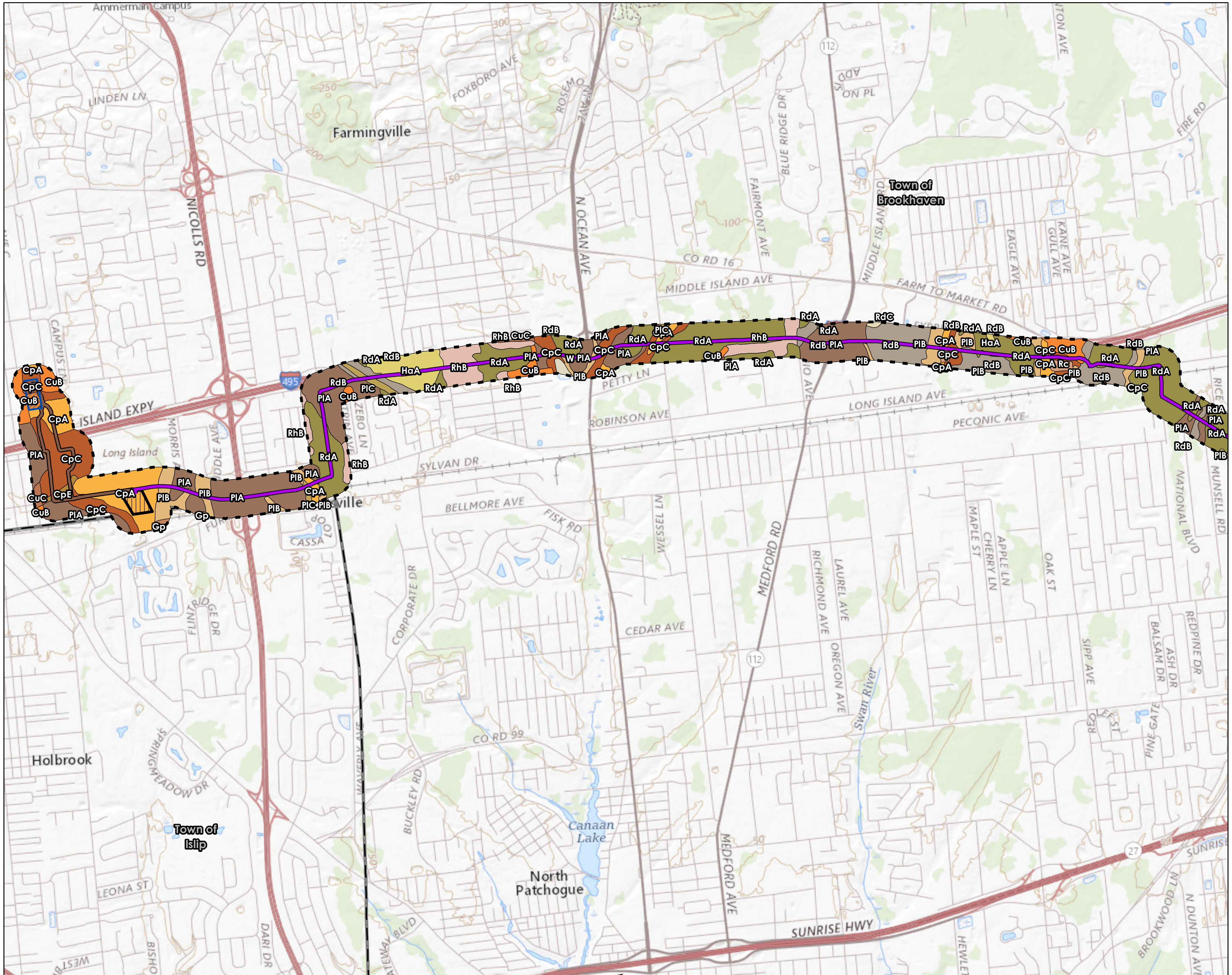

Revised Figure 4.5-2
Soil Classification

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
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- Landfall HDD C
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- Onshore Transmission Cable–LIE Service Road Route
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- Holbrook Substation
- 500 Feet from Project
- Village Boundary
- Town Boundary

Soil Classification

At	Gp	RdB
CpA	HU	RdC
CpC	HaA	RhB
CpE	PlA	SwA
CuB	PlB	Tm
CuC	PlC	Ur
Fd	Rc	W
	RdA	Wd
		We

Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018
Soil Survey Geographic Database (gSSURGO), 2019
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

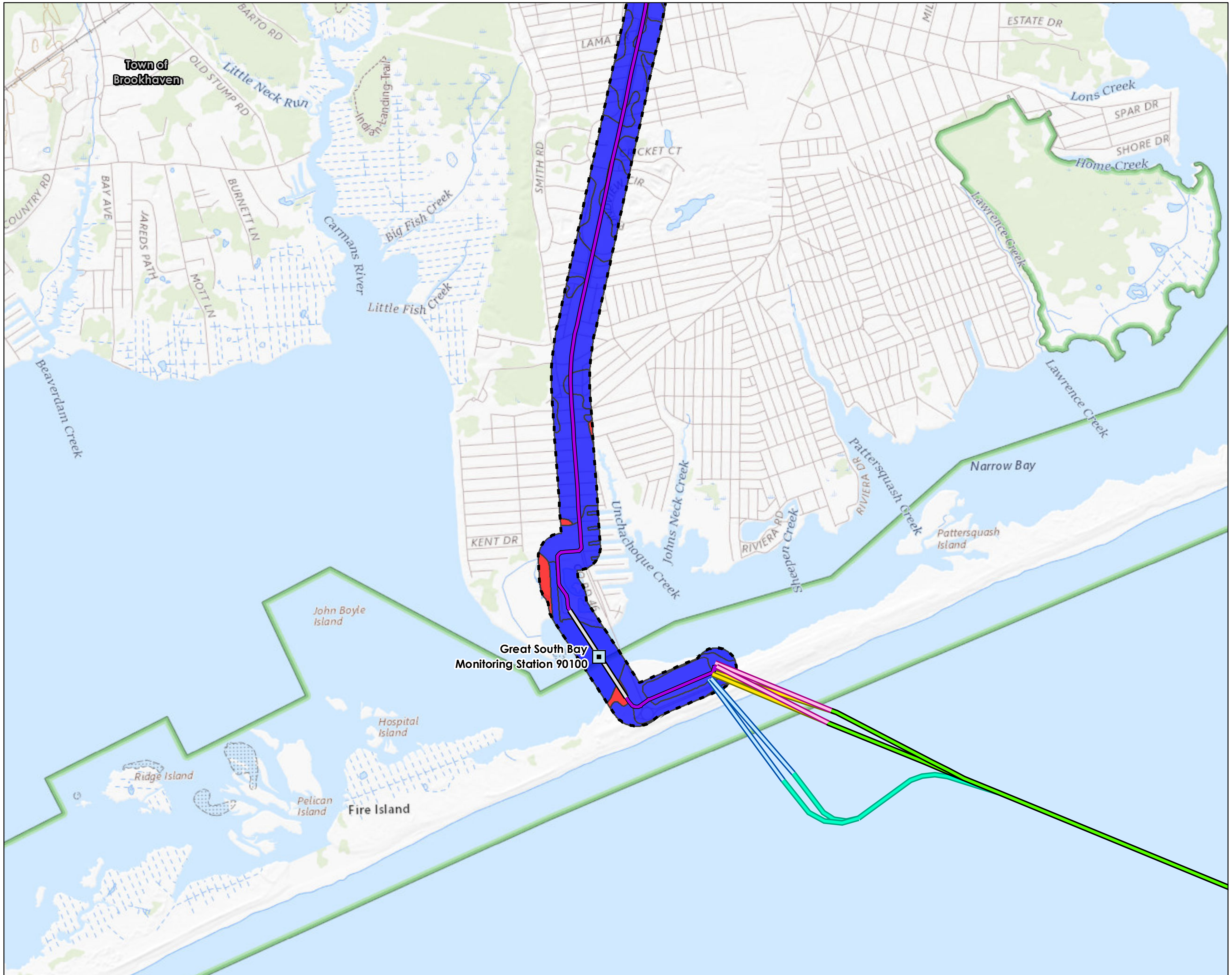
0 — 0.5 mile
0 — 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP

Revised: 2021-04-06 By: gcarpentier

Revised Figure 4.5-3
Depth of Groundwater

Sunrise Wind | Powered by Ørsted & Eversource



Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
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- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Suffolk County Water Quality Monitoring Station
- 500 Feet from Project
- Town Boundary
- Village Boundary

Depth to Water Table
- 0 - 25 cm
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

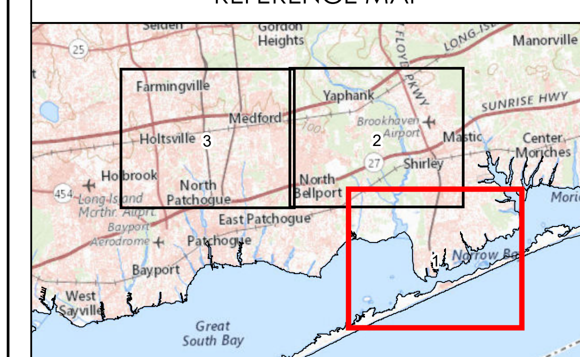
Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018 Soil Survey Geographic Database (gSSURGO), 2019 USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 miles
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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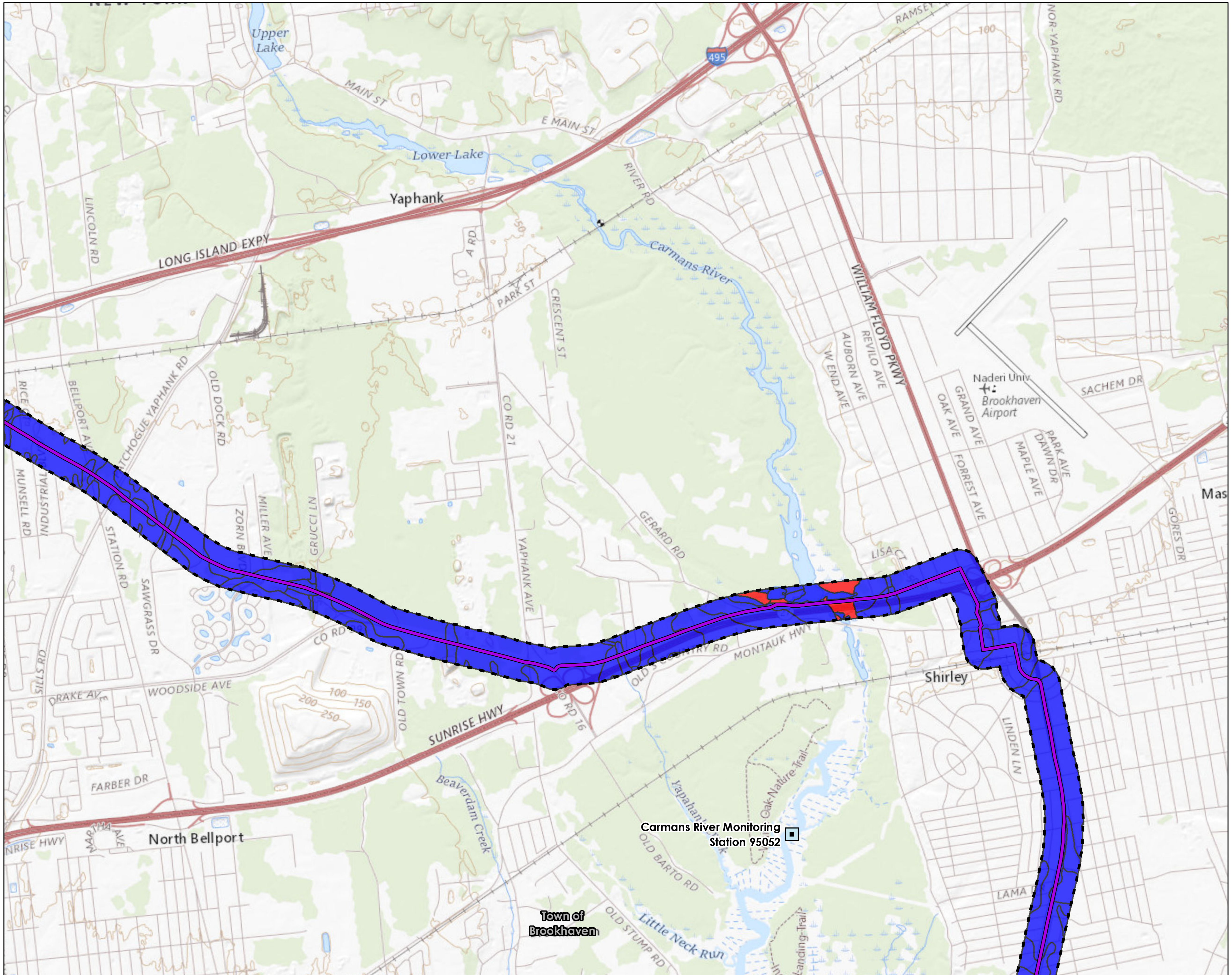

Revised Figure 4.5-3
Depth of Groundwater

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
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- Landfall HDD C
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- Onshore Transmission Cable–LIE Service Road Route
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Suffolk County Water Quality Monitoring Station
- 500 Feet from Project
- Town Boundary
- Village Boundary

Depth to Water Table
- 0 - 25 cm
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

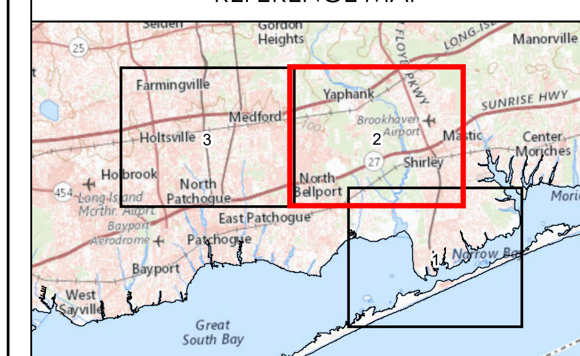
Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018 Soil Survey Geographic Database (gSSURGO), 2019 USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 — 0.5 miles
0 — 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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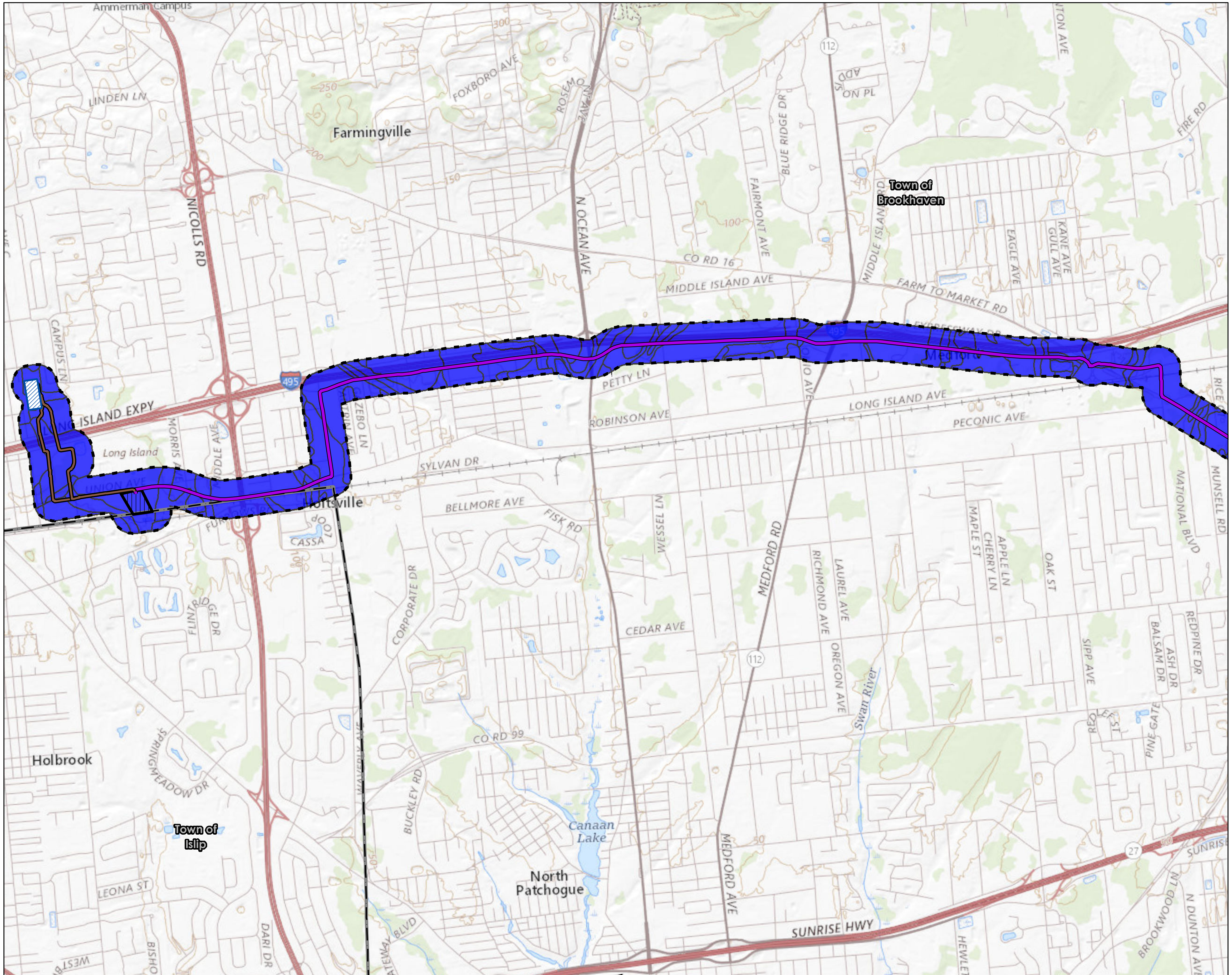

Revised Figure 4.5-3
Depth of Groundwater

Sunrise Wind | Powered by Ørsted & Eversource

Legend

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Note
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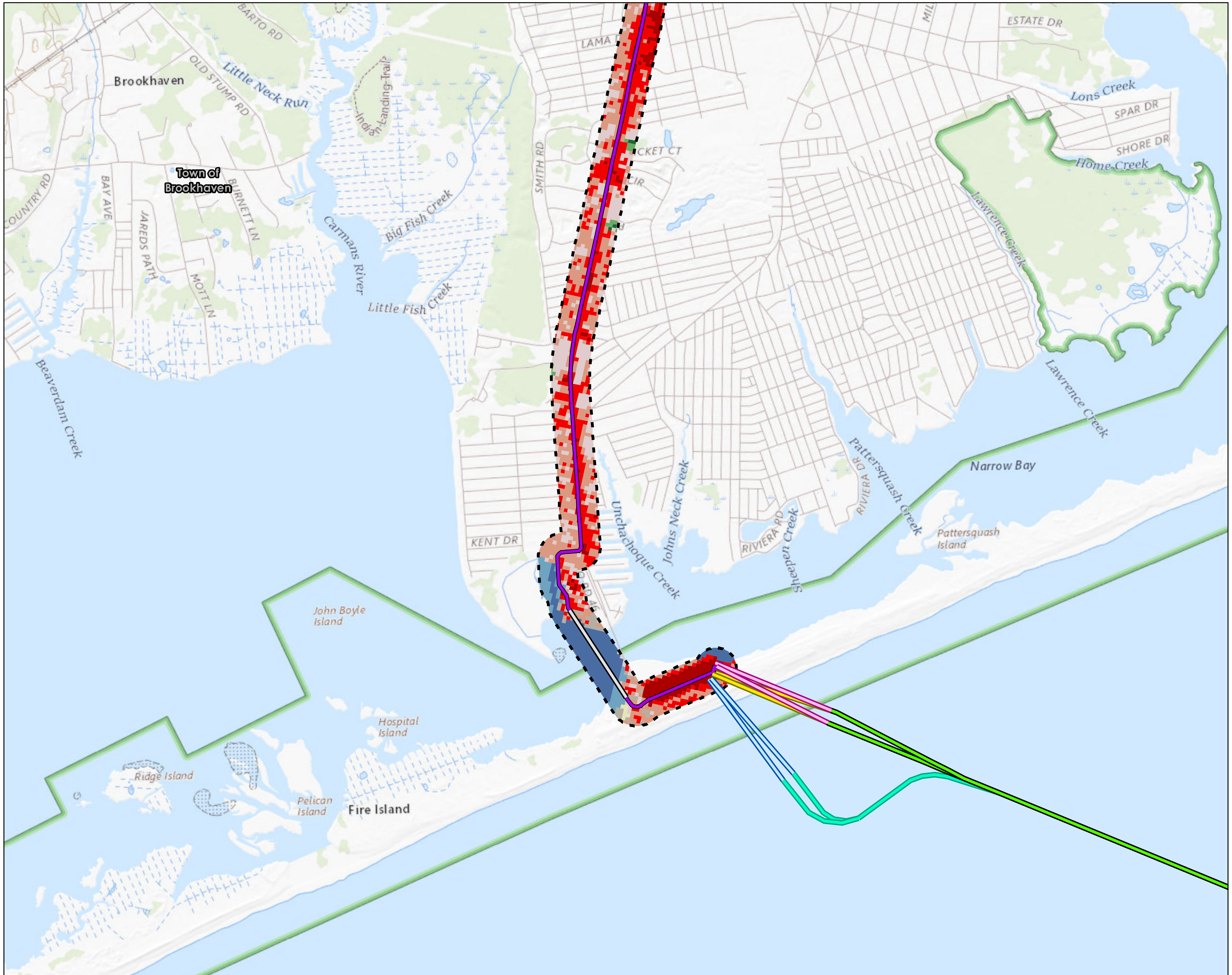
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 miles
0 0.75 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



Revised Figure 4.6-1
National Land Cover Database

Sunrise Wind | Powered by Ørsted & Eversource

Legend

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- Town Boundary

2016 National Land Cover Database

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed High Intensity
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Sources
Multi-Resolution Land Characteristics (MRLC) consortium, 2016
NYS Office of IT Services GPO, NYS Boundaries, 2018 USGS Topo Map

Note
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Date	3/1/2021
Project Number	2028113199
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Reviewed By	SBG

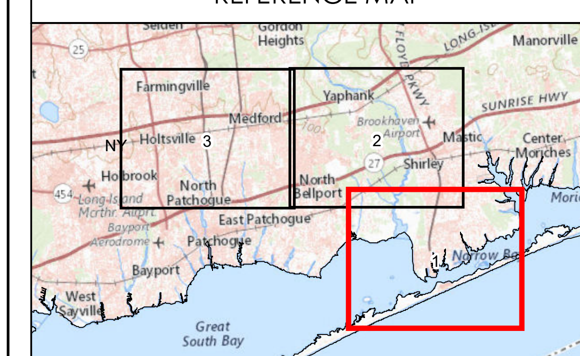
0 0.5 mile

0 0.75 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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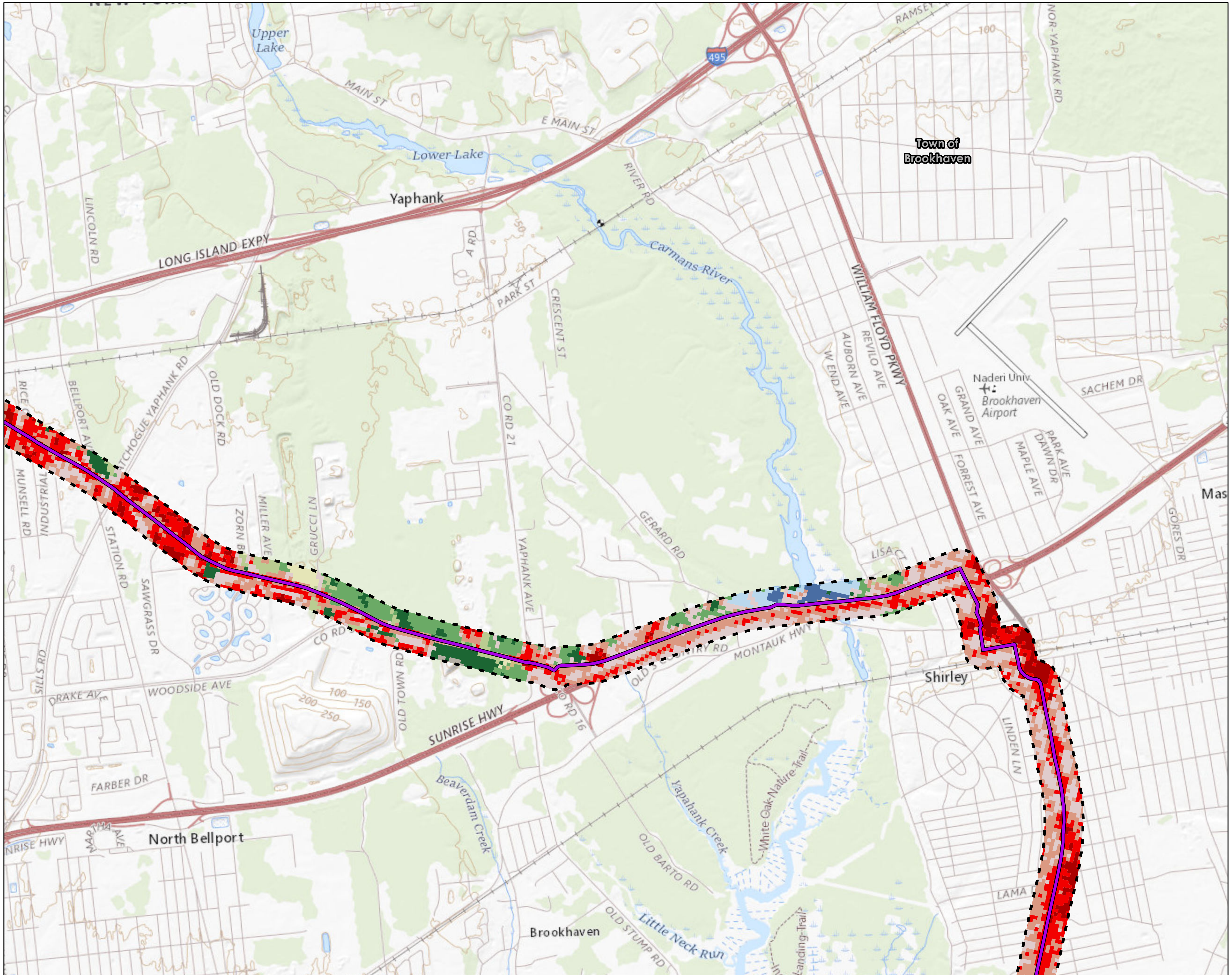

Revised Figure 4.6-1
National Land Cover Database

Sunrise Wind | Powered by Ørsted & Eversource

Legend

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NYS Office of IT Services GPO, NYS Boundaries, 2018 USGS Topo Map

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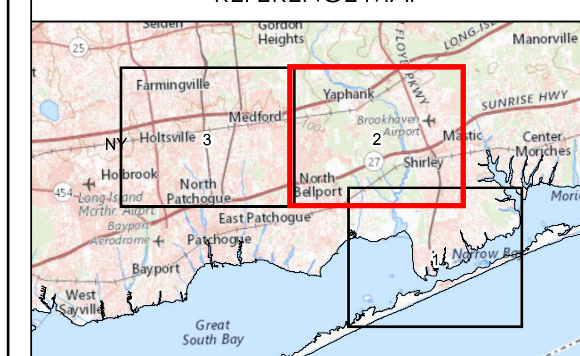
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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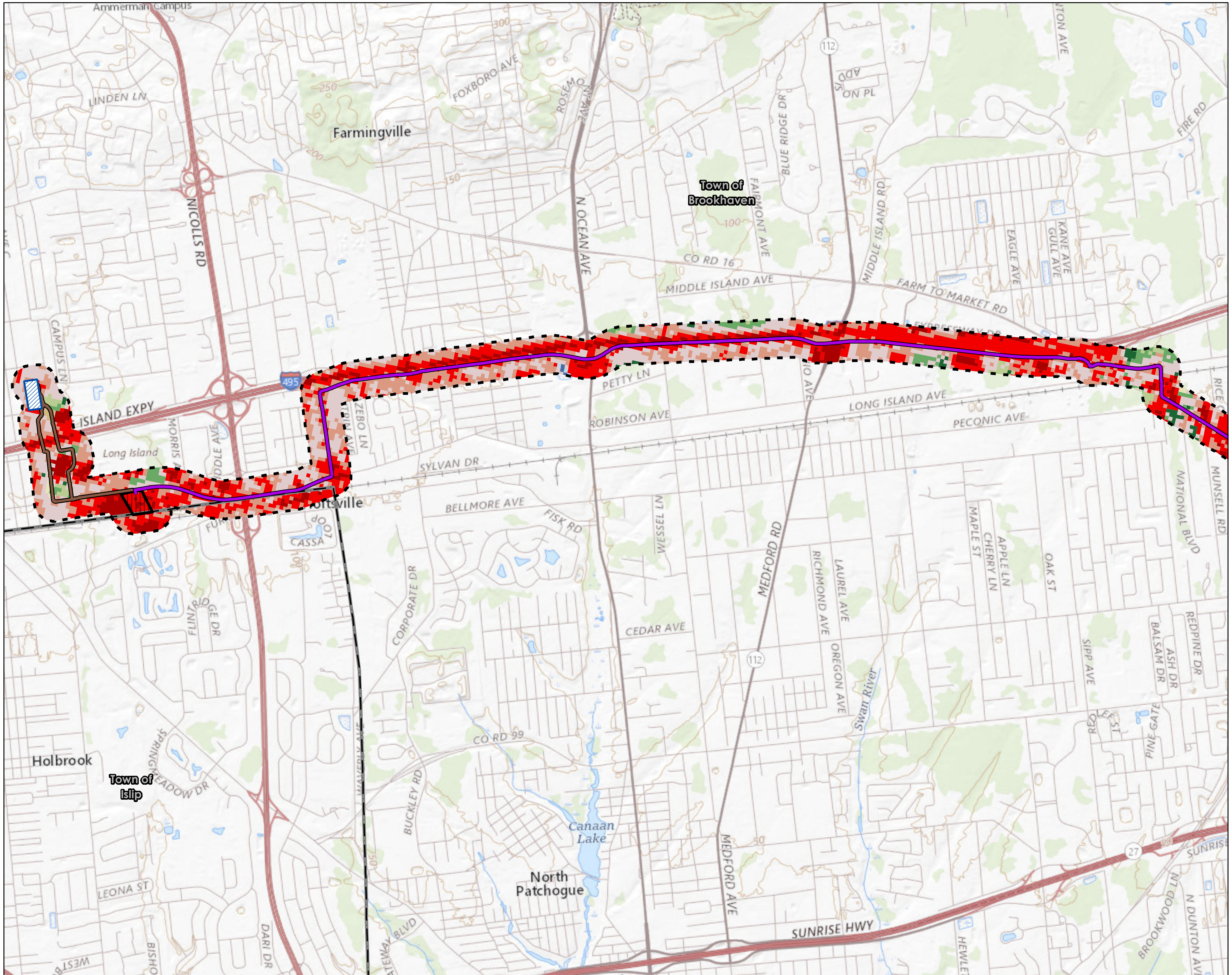

Revised Figure 4.6-1
National Land Cover Database

Sunrise Wind | Powered by Ørsted & Eversource

Legend

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- Village Boundary
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- Developed, Open Space
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Sources
Multi-Resolution Land Characteristics (MRLC) consortium, 2016
NYS Office of IT Services GPO, NYS Boundaries, 2018 USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

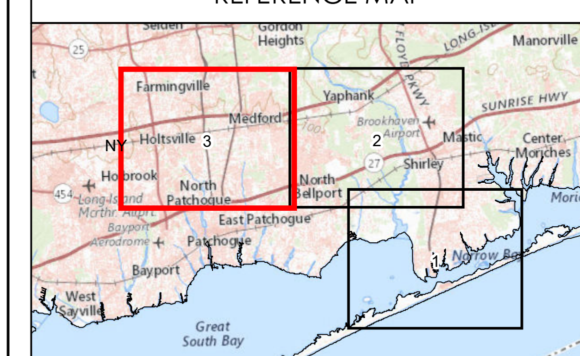
0 0.5 mile

0 0.75 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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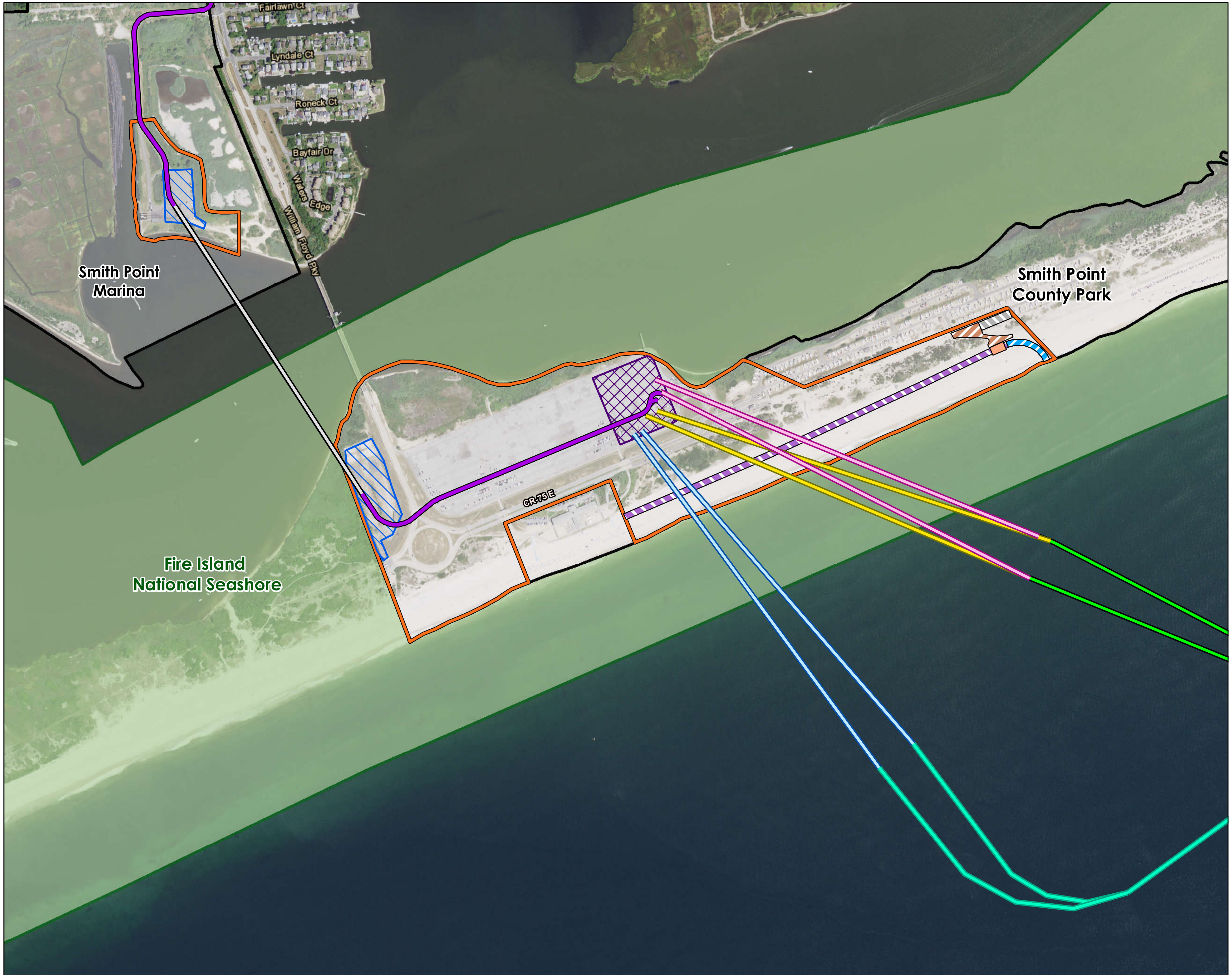


Revised Figure 4.7-1
Landfall/ICW Study Area

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable LIE Service Road Route
- Landfall/ICW Study Area
- Landfall Work Area
- ICW Work Area
- Pipe Welding Area
- Pipe Sea Access
- Pipe Storage
- Pipe Stringing Area
- Indicative Access to Pipe Areas
- Smith Point County Park
- Fire Island National Seashore

Notes

1. SRWEC route will have one landfall location. Routes are indicative and subject to engineering design changes.
2. The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Sources

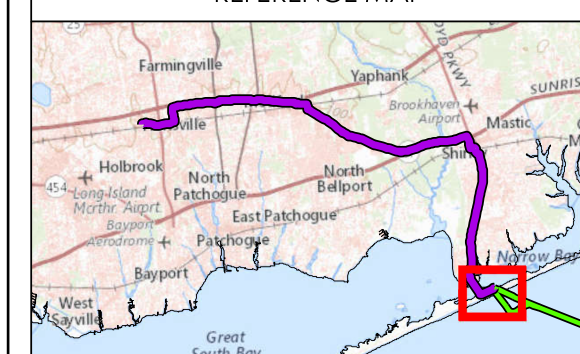
NYSDEC, NPS
Base map: NAIP 2019

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 — 800 feet
0 — 250 meters
N

Scale at 11x17: 1:9,600
NAD 1983 2011 UTM Zone 18N

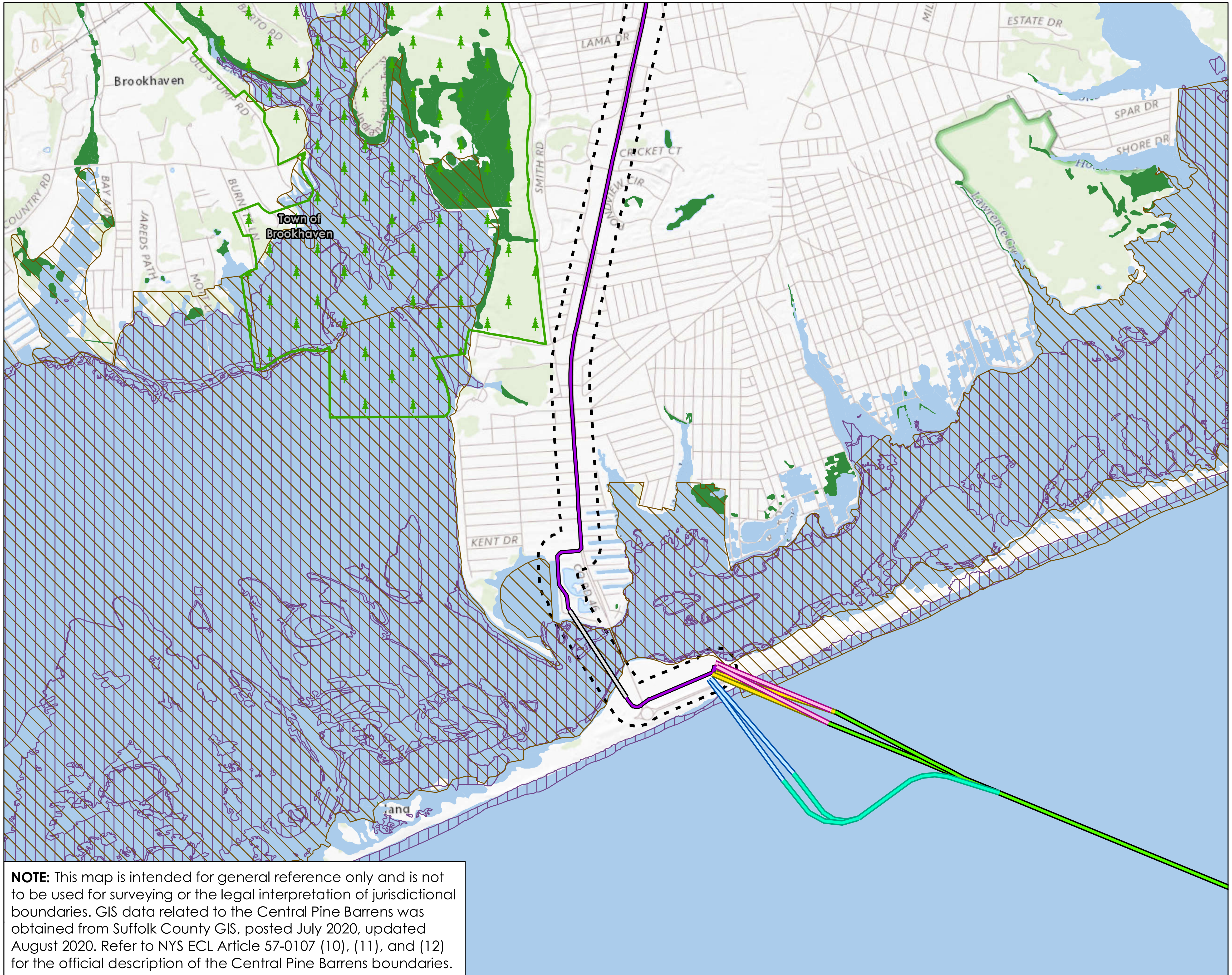
REFERENCE MAP



V:\1956\active_Task Owner and other Non-BC1956 Jobs\2028113199\03_data\gis_cad\gis\MXDs\ArticleVII\2028113199_4.7-1_LandfallStudyArea.mxd Revised: 2021-03-29 By: gcarpentier

Revised Figure 4.7-2
Significant and Critical Natural Communities and Habitats

Sunrise Wind | Powered by Ørsted & Eversource



NOTE: This map is intended for general reference only and is not to be used for surveying or the legal interpretation of jurisdictional boundaries. GIS data related to the Central Pine Barrens was obtained from Suffolk County GIS, posted July 2020, updated August 2020. Refer to NYS ECL Article 57-0107 (10), (11), and (12) for the official description of the Central Pine Barrens boundaries.

Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Town Boundary
- Central Pine Barrens Core Preservation Area
- NYSDOS Significant Coastal Fish and Wildlife Habitats
- NYS Natural Heritage Community Occurrences

NWI Wetlands
- Estuarine and Marine Wetlands
- Freshwater Wetlands

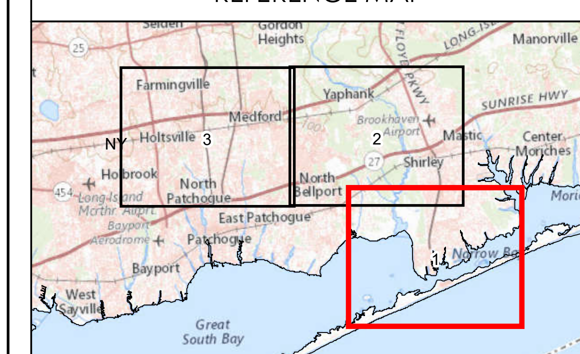
Sources
NYS Office of IT Services GPO, NYS Boundaries, 2018
USFWS NWI Wetlands, 2018
USGS Topo Map

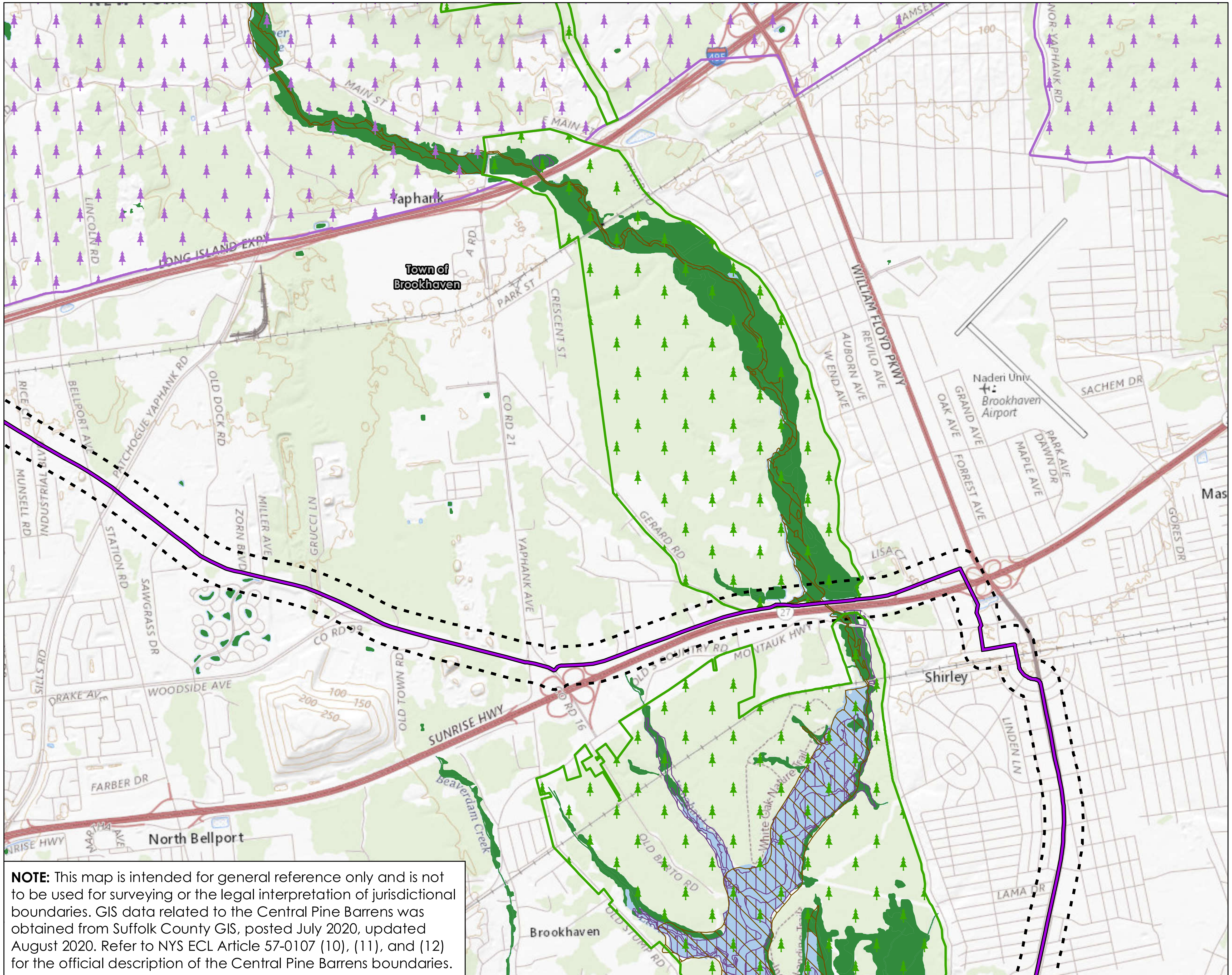
Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP





NOTE: This map is intended for general reference only and is not to be used for surveying or the legal interpretation of jurisdictional boundaries. GIS data related to the Central Pine Barrens was obtained from Suffolk County GIS, posted July 2020, updated August 2020. Refer to NYS ECL Article 57-0107 (10), (11), and (12) for the official description of the Central Pine Barrens boundaries.

Revised Figure 4.7-2
Significant and Critical Natural Communities and Habitats

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Town Boundary
- Central Pine Barrens Core Preservation Area
- Central Pine Barrens Compatible Growth Area
- NYSDOS Significant Coastal Fish and Wildlife Habitats
- NYS Natural Heritage Community Occurrences

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- Estuarine and Marine Wetlands
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USFWS NWI Wetlands, 2018
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Note
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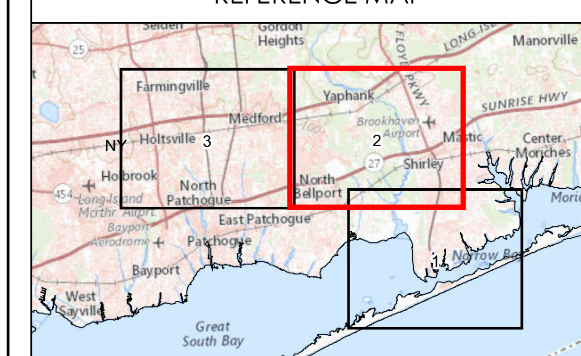
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 — 0.5 mile
0 — 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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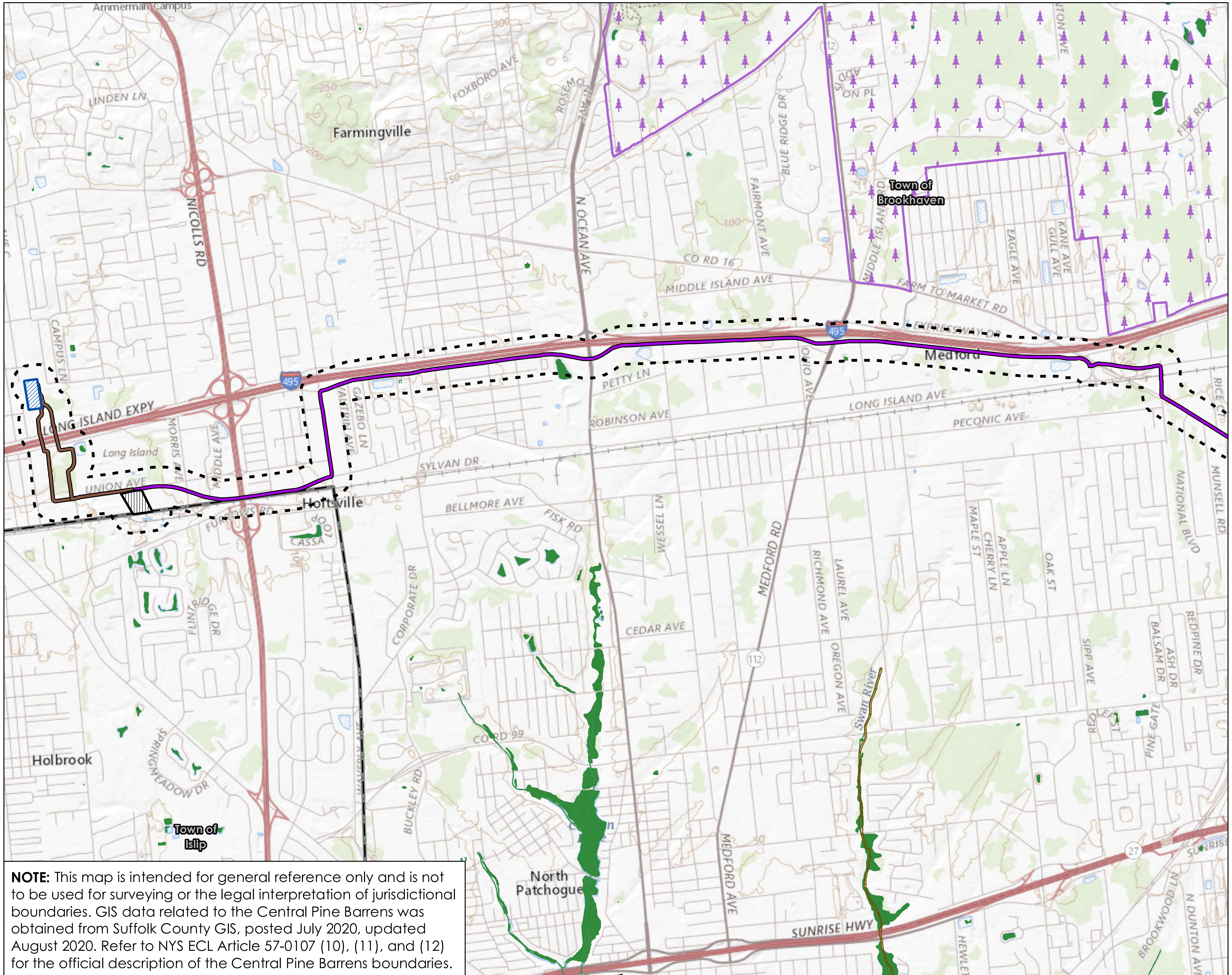

NOTE: This map is intended for general reference only and is not to be used for surveying or the legal interpretation of jurisdictional boundaries. GIS data related to the Central Pine Barrens was obtained from Suffolk County GIS, posted July 2020, updated August 2020. Refer to NYS ECL Article 57-0107 (10), (11), and (12) for the official description of the Central Pine Barrens boundaries.

Revised Figure 4.7-2
Significant and Critical Natural Communities and Habitats

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Onshore Transmission Cable–LIE Service Road Route
- Onshore Interconnection Cable Route
- Union Avenue Site
- Holbrook Substation
- 500 Feet from Project
- Village Boundary
- Town Boundary
- Central Pine Barrens Compatible Growth Area
- NYSDOS Significant Coastal Fish and Wildlife Habitats

NWI Wetlands
- Freshwater Wetlands

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NYS Office of IT Services GPO, NYS Boundaries, 2018
USFWS NWI Wetlands, 2018
USGS Topo Map

Note
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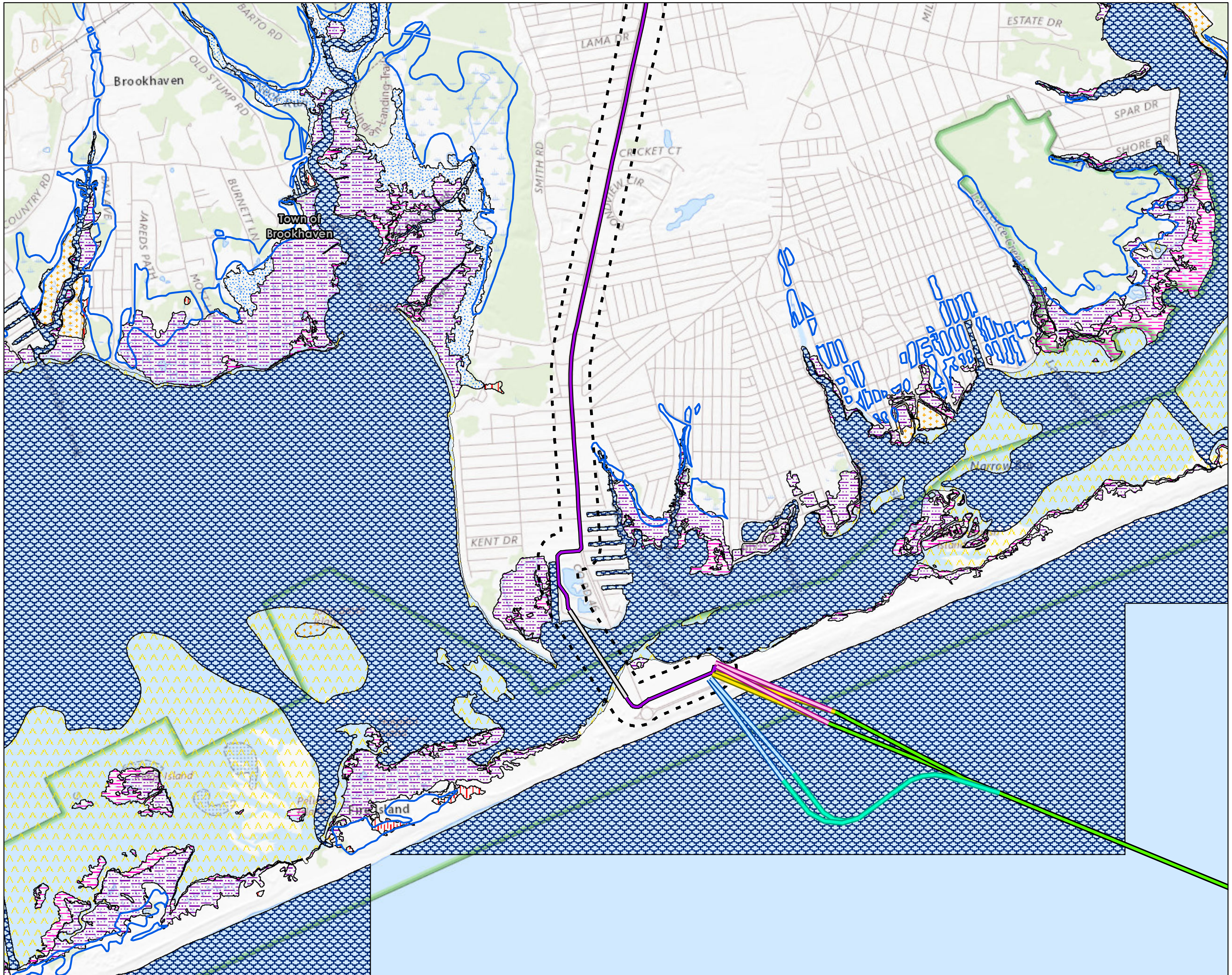
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



Revised Figure 4.7-3
Wetlands and Waterbodies

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- Onshore Interconnection Cable Route
- Union Avenue Site
- Holbrook Substation
- 500 Feet from Project
- Village Boundary
- Town Boundary
- NYSDEC Wetlands

NYSDEC Tidal Wetlands–NYC and Long Island
- Dredged Spoil
- Formally Connected
- Fresh Marsh
- High Marsh
- High Marsh
- Intertidal Marsh
- Littoral Zone
- Coastal Shoals, Bars and Mudflats

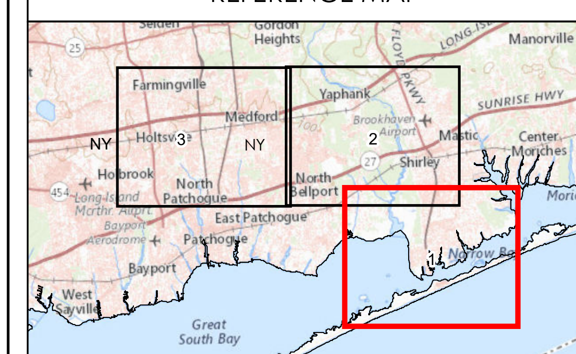
Sources
NYSDEC Wetlands, 2018
NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



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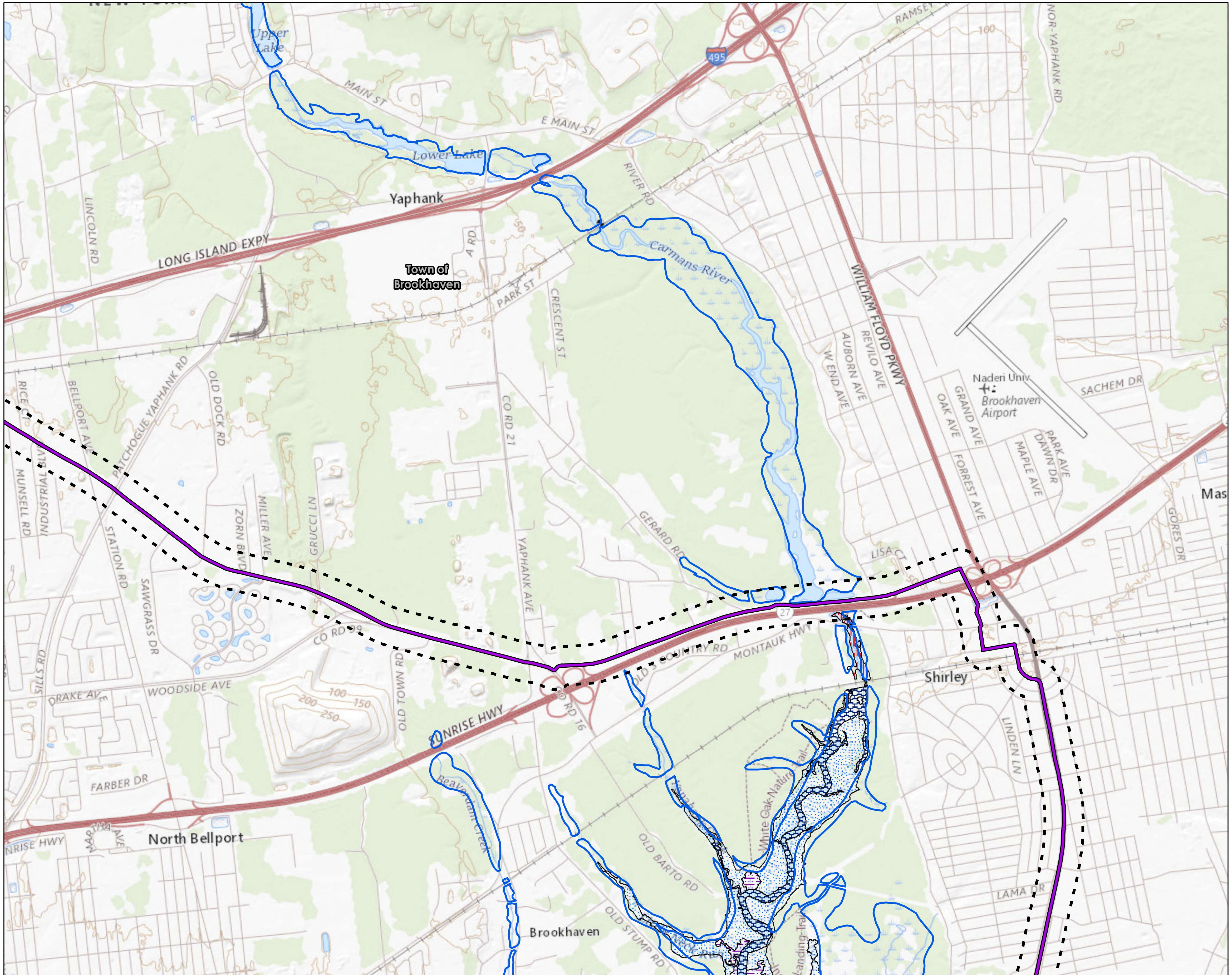

Revised Figure 4.7-3
Wetlands and Waterbodies

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
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- Village Boundary
- Town Boundary
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NYSDEC Tidal Wetlands–NYC and Long Island

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- High Marsh
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- Littoral Zone
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Sources
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NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Topo Map

Note
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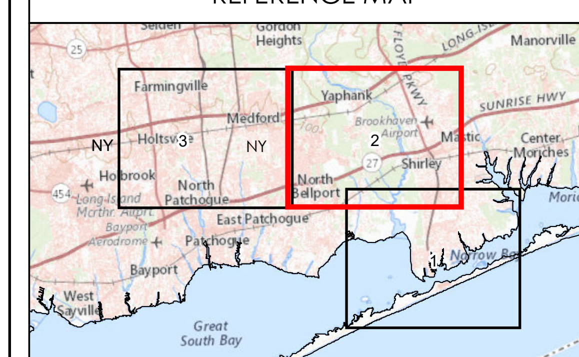
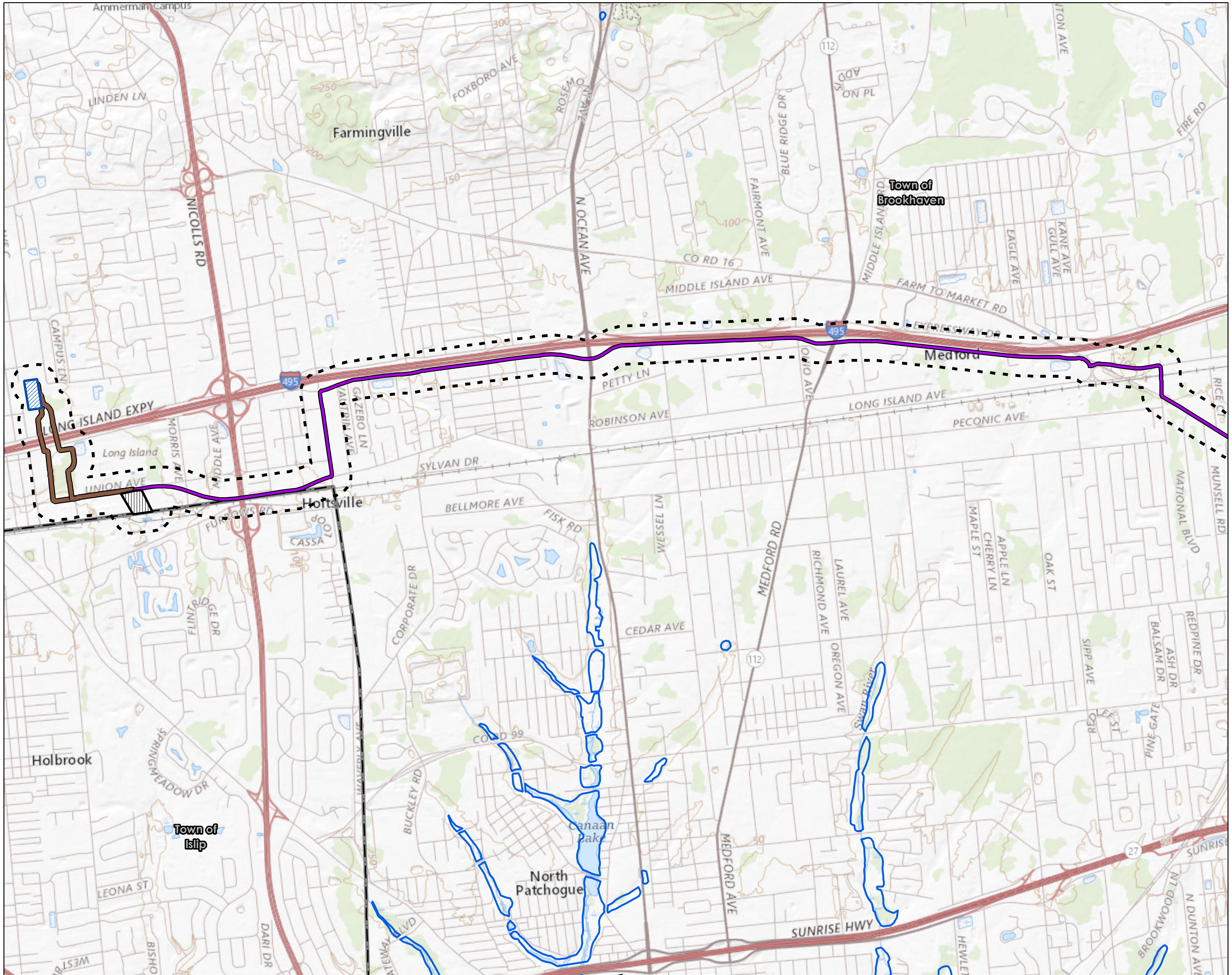
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



Revised: 2021-03-29 By: gcarpentier



Revised Figure 4.7-3
Wetlands and Waterbodies

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
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- Landfall HDD C
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- Union Avenue Site
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- 500 Feet from Project
- Village Boundary
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NYSDEC Tidal Wetlands–NYC and Long Island
- Dredged Spoil
- Formally Connected
- Fresh Marsh
- High Marsh
- High Marsh
- Intertidal Marsh
- Littoral Zone
- Coastal Shoals, Bars and Mudflats

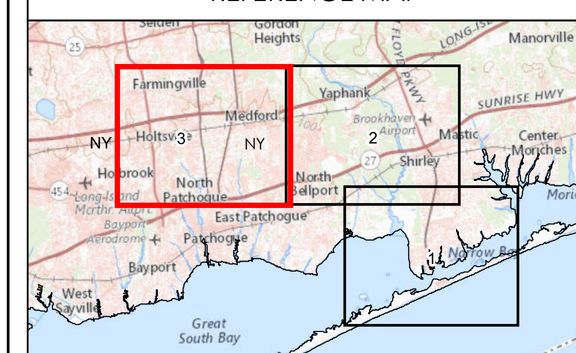
Sources
NYSDEC Wetlands, 2018
NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Topo Map

Note
The cable route centerline and trenchless crossing work areas are indicative and subject to final engineering design.

Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 0.5 mile
0 0.75 km
N
Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

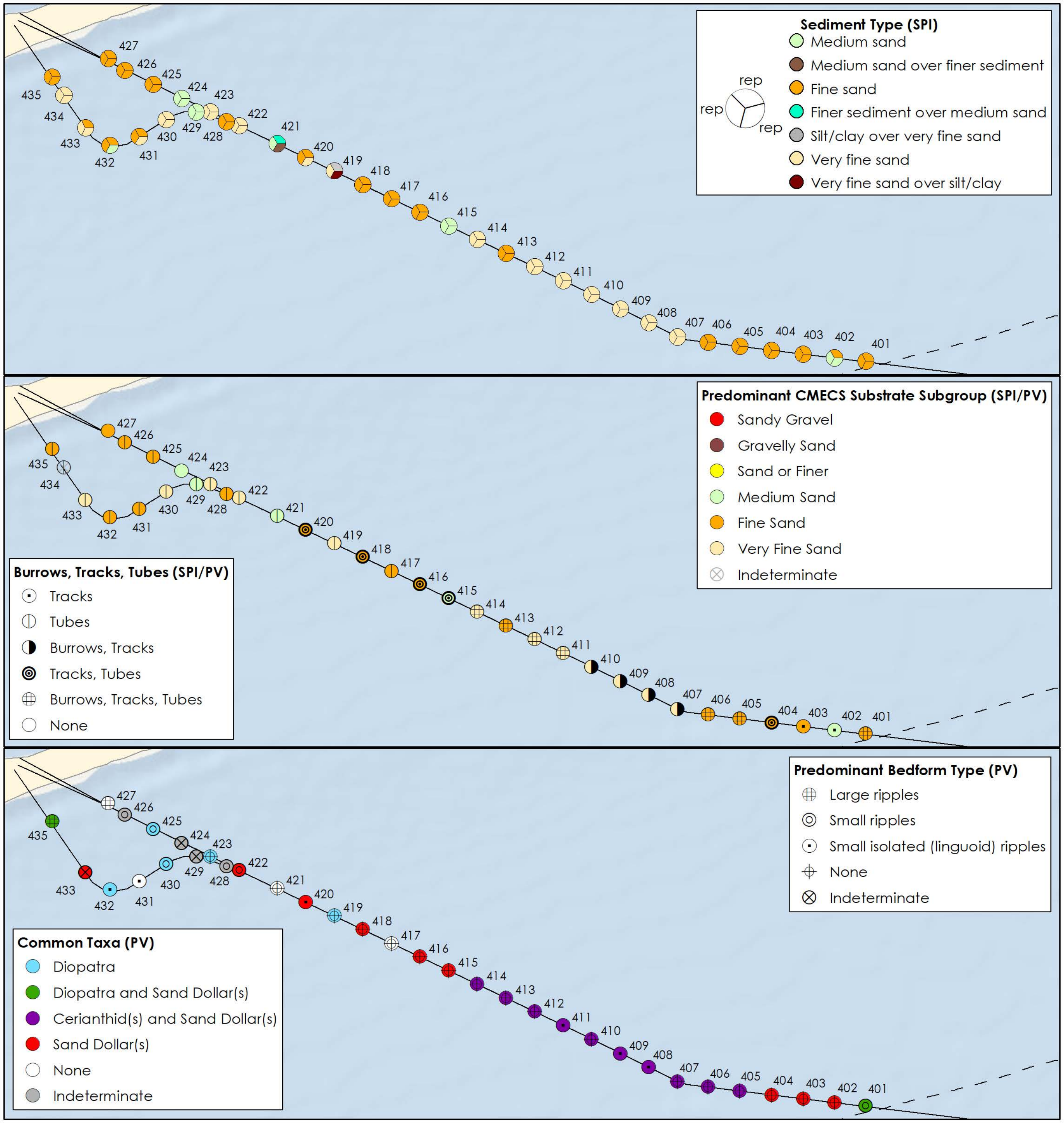
REFERENCE MAP



V:\1956\active_Task Owner and other Non-BC1956 Jobs\2028113199\03_data\gis_cad\gis\MXDs\ArticleVII\2028113199_4.7-3_WetlandsandWaterbodies.mxd Revised: 2021-03-29 By: gcarpentier

Figure 4.8-1
Sediment Classifications &
Visible Bedforms with Biological Activity
-SRWEC-NYS

Sunrise Wind | Powered by Ørsted & Eversource



Legend

— — 3 Nautical Mile State Water Boundary

——— Sunrise Wind Export Cable Route

Date	10/26/2020
Project Number	
Prepared By	
Reviewed By	

0 1 NM

0 1 Kilometers

0 500 Meters

N

Scale at 11x17: 1:56,216
NAD 1983 2011 UTM Zone 19N

REFERENCE MAP

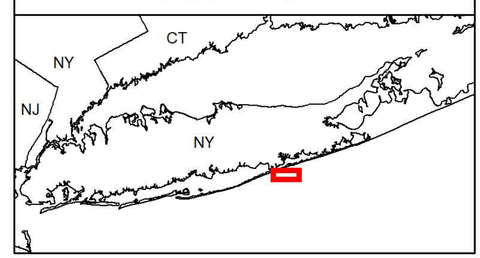


Figure 4.8-2
Sediment Classification & Submerged Aquatic Vegetation Presence - ICW

Sunrise Wind | Powered by Ørsted & Eversource

Legend

2020 PV Station
2020 PV, Grab Station
2020 Video Transects
Onshore HDD Route

2020 SAV Presence

- Yes
- Poor visibility

2018 Long Island South Shore Benthic Habitat

Source: NYDOS

- Seagrass Beds
- Benthic Macroalgae
- Emergent Wetland
- Mollusk Reef Biota
- Scrub-Shrub Wetland

Predominant CMECS Substrate Subgroup (SPI/PV)

- Sandy Gravel
- Gravelly Sand
- Sand or Finer
- Medium Sand
- Fine Sand
- Very Fine Sand
- Indeterminate

Date	10/26/2020
Project Number	
Prepared By	
Reviewed By	

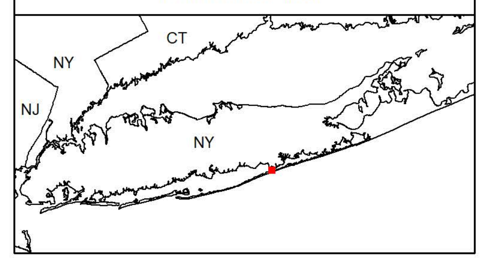
0 100 Meters

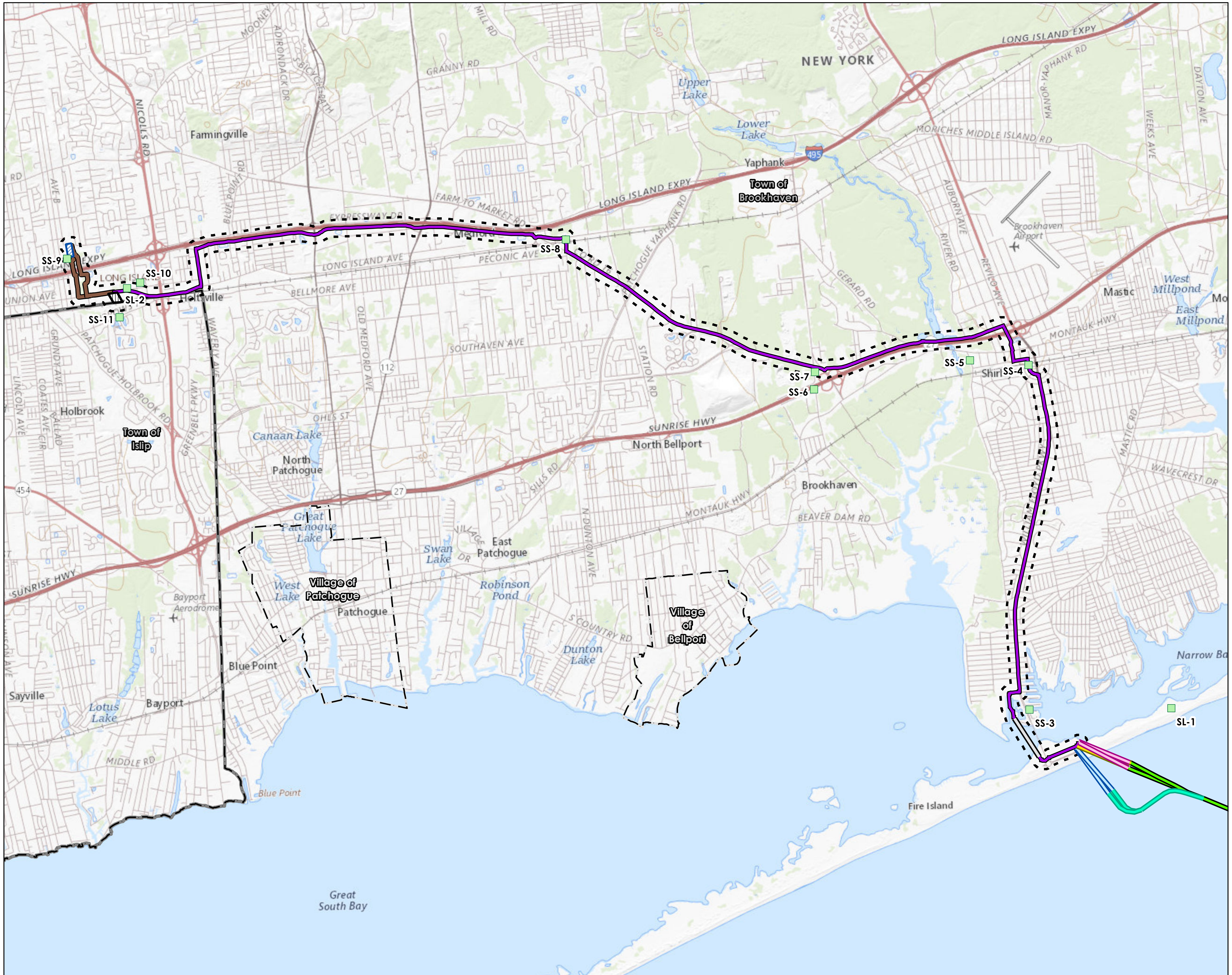
0 100 Feet

N

Scale at 11x17: 1:4,134
NAD 1983 2011 UTM Zone 19N

REFERENCE MAP





Revised Figure 4.12-1
Onshore Noise Measurement Locations

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- SRWEC–NYS (Western Landfall Option)
- Landfall HDD A
- Landfall HDD B
- Landfall HDD C
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- 500 Feet from Project
- Union Avenue Site
- Onshore Interconnection Cable Route
- Holbrook Substation
- Village Boundary
- Town Boundary
- Noise Measurement Location

Sources
Cornell IRIS, NYS Dept. Agriculture & Markets, Suffolk County, 2010
NYS Office of IT Services GPO, NYS Boundaries, 2018
USGS Topo Map

Note
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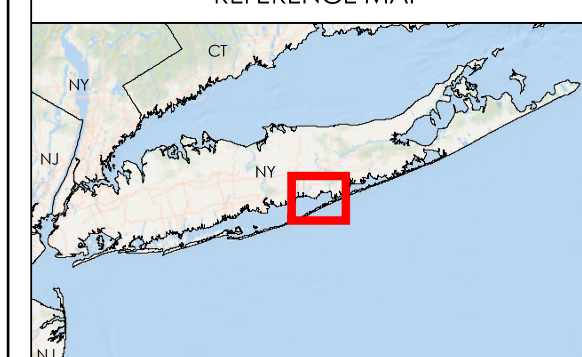
Date	3/1/2021
Project Number	2028113199
Prepared By	PWB
Reviewed By	SBG

0 — 1 mile
0 — 1.5 km
N
Scale at 11x17: 1:72,000
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



V:\1956\active_Task Owner and other Non-BC1956 Jobs\2028113199\03_data\gis_cad\gis\MXDs\ArticleVII\2028113199_4.12-1_Noise.mxd Revised: 2021-03-30 By: gcarpentier