

APPENDIX A
Assessment of Great South Bay Cable Routing Alternative



Poseidon Transmission Project

Assessment of Great South Bay Cable Routing Alternative

Suffolk County, New York

PREPARED FOR:

Poseidon Transmission 1, LLC
401 Edgewater Place, Suite 680
Wakefield, Massachusetts 01880

PREPARED BY:

ESS Group, Inc.
10 Hemingway Drive, 2nd Floor
East Providence, Rhode Island 02915

ESS Project No. P298-005

July 2018



TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 MARINE SEDIMENT CHARACTERIZATIONS IN GREAT SOUTH BAY	2
2.1 Existing Sediment Conditions.....	2
2.2 Potential Environmental Impacts.....	2
3.0 BENTHIC COMMUNITY CHARACTERIZATION	2
3.1 Existing Benthic Communities.....	3
3.2 Potential Environmental Impacts.....	3
4.0 SIGNIFICANT COASTAL FISH AND WILDLIFE HABITAT	3
4.1 Existing Significant Coastal Fish & Wildlife Habitats.....	4
4.2 Potential Environmental Impacts.....	4
5.0 COMMERCIAL AND RECREATIONAL NAVIGATION.....	5
5.1 Existing Navigation Channels.....	5
5.2 Commercial Vessel Traffic.....	6
5.3 Potential Environmental Impacts.....	6
6.0 INSTALLATION METHODOLOGY	6
6.1 Horizontal Directional Drill (Landfall).....	7
6.2 Dredging and Temporary Gravity Cell/Cofferdam	8
6.3 Subsea Cable Installation.....	8
7.0 TIDAL AND FRESHWATER WETLAND RESOURCES	10
7.1 Existing Tidal and Freshwater Wetland Resources	10
7.2 Potential Environmental Impacts.....	10
8.0 SUSPENDED SEDIMENT AND TRANSPORT	11
8.1 Increases in Ambient Levels of Suspended Sediment.....	11
8.2 Potential Environmental Impacts.....	11
9.0 RARE, THREATENED, AND ENDANGERED SPECIES.....	11
9.1 Existing Rare, Threatened & Endangered Species.....	11
9.2 Potential Environmental Impacts.....	14
10.0 SUBAQUATIC VEGETATION – EELGRASS BEDS	15
10.1 Existing Eelgrass Beds.....	15
10.2 Potential Environmental Impacts.....	15
11.0 MARINE RESOURCES	16
11.1 Existing Shellfish Beds	16
11.2 Existing Fish	16
11.3 Essential Fish Habitat Species	16
11.4 Other Marine Resources	17
11.5 Potential Environmental Impacts.....	17
12.0 MITIGATION MEASURES	19
13.0 REPORT REFERENCES.....	21

TABLES

Table 1	State- and Federally-Listed Species Potentially Occurring along the Great South Bay Alternative Cable Route
Table 2	Summary of Specific Life Stage EFH Designations for Species in the Vicinity of the Great South Bay Alternative Cable Route



FIGURES

Figure 1	Project Locus
Figure 2	Sediment Types and Sample Locations
Figure 3	Significant Coastal Fish & Wildlife Habitat
Figure 4	Navigation
Figure 5	NYSDEC Tidal and Freshwater Wetlands
Figure 6	National Wetland Inventory Wetlands
Figure 7	Rare Species
Figure 8	Eel Grass Beds
Figure 9	Shellfish Beds



1.0 INTRODUCTION

In April 2015, Poseidon Transmission 1, LLC (Poseidon) filed a Request for Exception from Accommodation Plan for Longitudinal Use of Freeway Right-of-Way by Utilities (“Accommodation Plan”) from the New York State Department of Transportation (NYSDOT) for the Poseidon Electric Transmission Project. The Preferred high-voltage direct current (HVDC) Land Cable Route, presented in the Request for Exception, requires use of a total of approximately 5.4 miles of NYSDOT limited access freeway right-of-way (ROW), in six segments within the Jones Beach Causeway, Wantagh Parkway and Seaford Oyster Bay Expressway.

In January 2016, Poseidon submitted a Supplemental Alternatives Analysis to NYSDOT that included a detailed evaluation of possible alternative transmission line routes including Alternative Route #3 - Eastern Alternative HVDC Land Cable Route (Great South Bay Alternative Route – see Figure 1: Project Locus). This route is associated with the landfall at West Gilgo Beach on Jones Beach Island in the Town of Hempstead. The electric transmission route is approximately 11.6 miles extending from the subsea cable shoreline landfall at West Gilgo Beach to the existing HVDC Ruland Road Converter Station in Huntington, Long Island. Although this route does not involve use of any NYSDOT limited access freeway ROW, it would require an approximately 2.9-mile crossing of Great South Bay within back bay areas of the barrier beach that are classified as sensitive Significant Coastal Fish & Wildlife Habitat (SCFWH) by the New York State Department of Environmental Conservation (NYSDEC).

This alternative route assessment provides NYSDEC with a response to their request for additional information associated with the Great South Bay Alternative Route. Based on the research and findings of this assessment and the sensitive environmental setting in the area of Great South Bay, it is highly unlikely that state and federal regulatory permits would be approved for this bay crossing. This is primarily due to unacceptable water quality and fisheries habitat impacts associated with subsea cable installation via jet plow embedment operations in a highly sensitive and shallow estuarine back bay environment. Moreover, onerous time of year restrictions and extensive impact mitigation measures would likely be imposed by state and federal agencies, along with extensive long term mitigation and environmental monitoring in Great South Bay for several years after installation. These siting and permitting factors for the Great South Bay Alternative Route make it undesirable from an installation and permit feasibility standpoint and justifies why this alternative was not selected as the Preferred Alternative previously presented. The risks associated with Great South Bay Alternative Route, particularly where it crosses Gilgo Beach and Great South Bay, poses unreasonable and unacceptable risk for a successful HVDC transmission line installation.

To further substantiate this rationale, the New York State Energy Research and Development Authority (NYSERDA), in their New York State Offshore Wind Master Plan Cable Landfall Permitting Study (NYSERDA 2017), defined hard constraints in this geographic area as resources that create avoidance areas due to the potential inability to mitigate impacts. The sensitive and protected environmental resources identified in the area of the Great South Bay Alternative Route cannot be entirely avoided or minimized during construction due to existing environmental and physical conditions and regulatory permitting constraints on both the state and federal levels. Hence we consider this segment of the transmission line to be characterized as a hard constraint in the context of project permitting feasibility. Finally, any adoption of this alternative route has not yet been reviewed or approved by property owners, agencies or stakeholders up to this point, and that needed step in route review adds another level of permitting and construction risk and uncertainty that is not deemed acceptable for the Project given the lesser impacts and risk profile of the Preferred Alternative.

2.0 MARINE SEDIMENT CHARACTERIZATIONS IN GREAT SOUTH BAY

NYSDEC Request

Sediment samples along the Great South Bay Alternative route to the depth of HVDC cable installation, including grain size distribution for samples. The top two feet must be analyzed separately from the bottom portion of the core. A sediment sampling plan for the Great South Bay Alternative route would need to be submitted to the NYSDEC for approval prior to collecting samples.

2.1 Existing Sediment Conditions

For the purposes of this alternative route assessment, Poseidon did not need to undertake any route-specific and additional field sampling to characterize existing marine sediments along the Great South Bay Alternative Route subsea cable segment. Instead, we were able to research and reference readily-available resources, including geospatial databases, recently prepared by others to help generally characterize surface and shallow subsurface sediment types that may occur along the Great South Bay Alternative Route without the need for route-specific field sampling.

As expected and shown in Figure 2, surficial and shallow sub bottom geology along the Great South Bay Alternative Route can be generally characterized as sandy silt with clay. Sand-sized sediment is the predominant grain size averaging around 65% of the sediment matrix with the remaining percentages of grain sizes consisting of silts and clays (35%). These sediment characteristics are typical of back bay deposits landward of the barrier beach system. These back bay and estuarine lagoon settings landward of West Gilgo Beach are typically characterized as sandy silts and shallow waters due to decreased wave and tide energy landward of the barrier beach. These conditions provide highly suitable habitat for a variety of shellfish, finfish, and subaquatic vegetation, justifying the special aquatic habitat conditions designated by NYSDEC.

The Great South Bay Alternative Route subsea cable would follow the Amityville Cut, which is a maintained channel oriented north-south from the State Boat Channel landward of Jones Beach Island to the East-West Channel on the north side of Great South Bay. Given the predominance of sand, sediment dredged historically from the Amityville Cut has been beneficially re-used and deposited on Helicopter Island (Sand Island) located immediately east of the Amityville Cut. More recent accumulations of sediment in Amityville Cut may be mixed with the underlying finer matrices comprising the back barrier lagoonal deposits.

2.2 Potential Environmental Impacts

Sediments expected to be encountered by jet plow installation activities within Great South Bay would likely result in high water quality impacts (total suspended solids, TSS) perhaps combined with near- and far-field sediment transport and deposition of jetted sediments and would create short-term and possibly longer-term environmental impacts to aquatic resources in this protected habitat area. This finding leads us to reject the Great South Bay Alternative Route to the Preferred Alternative that avoids these potential impacts altogether.

3.0 BENTHIC COMMUNITY CHARACTERIZATION

NYSDEC Request

Characterization of benthic community along the entire Great South Bay Alternative route. A benthic characterization plan would need to be submitted for NYSDEC approval prior to collecting samples.

3.1 Existing Benthic Communities

For the purposes of this alternative route assessment, Poseidon did not undertake route-specific bottom sampling of benthic (invertebrate and vegetative) seabed resources along the Great South Bay Alternative Route subsea cable segment. Instead, readily-available agency resource information and geospatial databases were reviewed to develop an adequate response to this request in order to generally characterize the diversity and density of benthic seabed communities along the Great South Bay Alternative route.

As a back bay barrier beach complex, it is well known that Great South Bay includes a variety of benthic habitats, including shellfish beds, eelgrass and subaquatic vegetation, intertidal mudflats, extensive fringing salt marsh habitat, and non-vegetated sandy bottom areas (NYSOPD 2008a). As discussed in Section 2, the sediment types along the Great South Bay Alternative Route are predominantly silty sands with lesser amounts of mud and clay, depending on location. Therefore, most of the benthic habitat along the route in Great South Bay is expected to be located on non-vegetated sands or mud flats with fringing salt marsh perimeters. For a discussion of eelgrass and shellfish beds see Sections 10 and 11, respectively.

MacKenzie (2003) noted that the benthic community in the region of the Great South Bay Alternative Route was dominated by polychaete worms, though nemertean ribbon worms and harpacticoid copepods were also abundant. Amphipods, various clams, isopods, and anemones were also observed (MacKenzie 1994). Similarly, a separate 1994 study indicated that blue mussels (*Mytilus edulis*), northern quahog or hard clam (*Mercenaria mercenaria*), daggerblade grass shrimp (*Palaemonetes pugio*), sand shrimp (*Crangon septemspinosa*), blue crab (*Callinectes sapidus*), bay scallop (*Argopecten irradians*), American oyster (*Crassostrea virginica*), and lobster (*Homarus americanus*) were present in Great South Bay (Stone et al. 1994). Additionally, blue crab abundance has increased notably within Great South Bay since the 1990's, and this species is currently being monitored by NYSDEC (2016).

3.2 Potential Environmental Impacts

Installation of a subsea cable, including jet plow operation and dredging within the temporary gravity cells/cofferdams at the landfall locations, is expected to have temporary and localized impacts on marine benthic resources and habitats along the Great South Bay Alternative Route. Acute exposures to high TSS and seabed surface disturbance along a narrowly incised trench are expected to occur. It is expected that there would be some unavoidable mortality, injury, or displacement of infaunal and epifaunal benthic organisms along the jetted route, including shellfish and perhaps some subaquatic vegetation. These impacts are again localized and temporary. However, once jet plow installation is complete and dredged areas are backfilled, the benthic macroinvertebrate community is expected to quickly re-establish itself along with the seabed profile to pre-construction conditions within several weeks or months depending upon the time of year (Van Dolah et al. 1984, McCabe et al. 1998, Guerra-García et al. 2003).

4.0 SIGNIFICANT COASTAL FISH AND WILDLIFE HABITAT

NYSDEC Request

Delineation of the extent of SCFWH along the Great South Bay Alternative route and a narrative discussion of the proposed impacts.

4.1 Existing Significant Coastal Fish & Wildlife Habitats

As shown in Figure 3, the Great South Bay back bay estuary is almost entirely designated as SCFWH. The Great South Bay Alternative Route traverses approximately 0.1 mile of the Jones Beach East (Gilgo Beach) SCFWH and approximately 2.9 miles of the western portion of the Great South Bay-West SCFWH.

The Jones Beach East SCFWH extends from the Nassau/Suffolk County Line, along the beach south of Ocean Parkway, westward along Mean Low Water (MLW) to Oak Beach, to the northern side of Fire Island Inlet. This undeveloped active barrier beach complex is heavily used for residential and commercial uses and shoreline recreation including recreational fishing and birdwatching. Jones Beach East SCFWH provides nesting habitat for threatened and endangered bird species such as piping plover (*Charadrius melodus*), common tern (*Sterna hirundo*), and least tern (*Sternula antillarum*), and once hosted significant concentrations of roseate tern (*Sterna dougallii*) (protected) and black skimmer (*Rynchops niger*), though these species have not been observed in recent years (NYSOPD 2008b).

At approximately 34,000 acres, the Great South Bay-West SCFWH is one of the largest shallow coastal wetlands in the State of New York. The western region of the Bay is delimited by mean high water (MHW) elevation to the north and south, by the Islip-Brookhaven town line in the east, and by the Amityville cut, through which the subsea cable route would pass through in Great South Bay Alternative Route, in the west. As discussed in Section 3, benthic habitats in the Great South Bay are generally characterized as sandflats, mudflats, and fringing saltmarsh. Great South Bay also contains extensive eelgrass (*Zostera marina*) beds and shellfish resources, as discussed in Sections 10 and 11. Salt marshes, salt pannes, and intertidal mudflats are abundant in the Great South Bay-West, and dune communities are found on the barrier beaches bordering the Atlantic Ocean. Except in the Fire Island Inlet and navigational channels, water depths in the Bay are shallow and generally six feet or less (NYSOPD 2008a).

This region of Great South Bay provides important foraging, nesting, and overwintering habitat for an array of resident and migratory birds, including northern harrier (*Circus hudsonius*), black rail (*Laterallus jamaicensis*), roseate tern (*Sterna dougallii*), black skimmer (*Rynchops niger*), peregrine falcon (*Falco peregrinus*), osprey (*Pandion haliaetus*), and many other species. Several islands within the Bay host important rookeries for snowy egret (*Egretta thula*), great egret (*Ardea alba*), glossy ibis (*Plegadis falcinellus*), black-crowned night heron (*Nycticorax nycticorax*), and little blue heron (*Egretta caerulea*), and the Bay serves an important migratory stopover location for shorebirds including whimbrel (*Numenius phaeopus*) and black-bellied plover (*Pluvialis squatarola*). The salt marshes, tidal flats, eelgrass beds, sandy shoals, and estuarine areas within the Great South Bay provide habitat for high concentrations of estuarine finfish, shellfish, and other aquatic wildlife as discussed in Sections 10 and 11.

4.2 Potential Environmental Impacts

Installation of the subsea cable system, including jet plow operations and limited shore-based dredging to create the temporary gravity cells/cofferdams at the selected cable landfall locations, has the potential to impact fish and wildlife habitat within and in the immediate vicinity of subsea cable area corridor in Great South Bay. As discussed in Section 3, these impacts are acute, temporary and localized.

Nesting birds (both on the barrier beach and in back bay saltmarsh habitats) may be impacted by construction activity and noise, which may disrupt normal breeding, feeding, and resting activities. Nesting birds are especially vulnerable to disturbance between March 15 and August 15 (NYSOPD 2008a). Nearshore construction activities would be timed to avoid this period to help minimize impacts to nesting

birds. The use of horizontal directional drill (HDD) technology across the barrier beach is also expected to avoid impacts to sensitive nesting habitats at West Gilgo Beach. As discussed in section 11, installation of the subsea cable may impact fish species within Great South Bay due to temporary seabed disturbances and increases in TSS from jet plow operations. This effect is expected to be localized and temporary and is expected to subside within weeks of cable installation activities.

Given that almost all of Great South Bay is located within designated special coastal and wildlife habitat as described above, any significant disturbance of these species in their natural habitat and life cycle conditions creates potential impacts to this sensitive aquatic environment can be avoided by implementation of the Preferred Alternative that is largely land-based and avoids direct impacts to Great South Bay.

5.0 COMMERCIAL AND RECREATIONAL NAVIGATION

NYSDEC Request

There is navigational channel known as the Amityville Cut that is located along the Great South Bay Alternative Route. Please provide a map showing the proposed HVDC cable route in relation to the Amityville Cut. If the HVDC cable route will cross or be sited within a navigational channel, please provide the minimum depth of cover over the HVDC cable and a narrative discussing measures to avoid impacts to navigation.

5.1 Existing Navigation Channels

There are several state- and municipally-maintained navigation channels along the Great South Bay Alternative Route. However, there are no federally-maintained navigation channels crossed by the route. The Great South Bay Alternative Route is located within the Amityville Cut (channel) and crosses the State Boat Channel at the southern end and East-West Channel at the northern end of the route within Great South Bay as shown in Figure 4.

State Boat Channel

The State Boat Channel is a portion of the New York Inland Waterway that extends from East Rockaway Inlet to Shinnecock Canal and is maintained by the State of New York. Depths range from shoals to greater than 30 feet where tidal currents maintain an erosional channel. In the vicinity of Amityville Cut the State Boat Channel is charted as approximately 18 feet below mean lower low water (MLLW).

Amityville Cut

The Amityville Cut is maintained by the Town of Babylon, New York. This channel runs north-south from Amityville Creek to the State Boat Channel measuring approximately 100 feet wide by 8 feet deep at MLLW. The Amityville Cut is an important north-south conduit for vessels transiting between the northern and southern portions of Great South Bay. At the southern terminus it provides access to the Unqua Corinthian Yacht Club and West Gilgo Beach Association Basin. Historic shoaling of the Amityville Cut has been reported in state and municipal documents reviewed (NYDOS 2010) and dredged material has been beneficially re-used and deposited on Helicopter Island (Sand Island) located immediately east of the Amityville Cut.

East-West Channel

The East-West Channel is also maintained by the Town of Babylon, New York. The channel runs east-west from Unqua Point to the Oak Island Channel. This channel provides recreational boating access along the densely developed shoreline of the Town of Babylon.

5.2 Commercial Vessel Traffic

A review of the 2011-2016 USACE Waterborne Commerce Reports indicates an average of 31,898 commercial vessel trips per year were made on Great South Bay during that period. The highest numbers of vessel trips were observed to be in 2013 (49,668 trips) and 2014 (44,906 trips), likely associated with increased dredging required after Superstorm Sandy. Of these commercial vessel trips, all were reported to have been made by self-propelled dry cargo vessels (191,388 trips), with the exception of one tug trip reported in 2011.

5.3 Potential Environmental Impacts

As both recreation and commercial vessel traffic occurs with frequency within Great South Bay and the Great South Bay Alternative Route follows the alignment of the Amityville Cut for a significant portion of its length, potential impacts to navigation would be expected as a result of installation and maintenance of the subsea cable system at the seabed of the channel. This may limit future maintenance or improvement dredging within the Cut to improve its navigation capacity. Installation of the cable in the channel seabed would be disruptive to general navigation in the Cut. However, the installation of the subsea cable within Great South Bay would be expected to occur in the fall/winter window to minimize potential navigational impacts, avoiding periods of greatest vessel traffic activity within the channels.

The subsea cable system would likely be buried to a target depth of a minimum of approximately 4 feet below the present bottom elevation along the Great South Bay Alternative Route. The final burial depths would be negotiated with the USACE New York District and NYSDEC as may be appropriate, and likely as a condition of their regulatory approvals. The planned minimum cable burial depth below present bottom would provide adequate vertical clearance to avoid potential mechanical damage to the cable system by vessel anchors or groundings of vessels using these areas of Great South Bay. The installed cable system would be charted by NOAA on the next version of the Nautical Chart for Great South Bay. It is also expected that the cable area designation would be published in the Coast Pilot and Notice to Mariners. Cable area designations on NOAA Charts do not restrict or preclude vessel traffic or general navigation within these areas or preclude vessels from transiting or anchoring in the vicinity or over the subsea cable.

Although the installation of the subsea cable system in Great South Bay would be timed and installed to avoid temporary impacts to navigation, these impacts can be avoided by using the Preferred Alternative for the Project.

6.0 INSTALLATION METHODOLOGY

NYSDEC Request

A description of the HVDC cable installation method across the Great South Bay, including typical details for the methodology that will be employed (i.e., jet plow, directional drill, etc.).

The Great South Bay Alternative Route would make its offshore landfall on West Gilgo Beach on Jones Beach Island. The transition from the offshore subsea cable system is expected to be facilitated by the use

of HDD. HDD is a well-known method for subterranean drilling under earth surface features to allow for installation of a plastic conduit for which the cables can be pulled underneath the coastal feature, thereby avoiding direct disturbance of this surface landscape. It would avoid any direct excavation or disturbance of surface features with the natural barrier beach ridge, dune and beach face in this landfall area. Use of HDD technology also minimizes or avoids direct impacts to nearshore marine habitat and shorelines. The interconnection of the subsea cable with the HVDC land cable component would require a joint installed in a transition vault and a temporary gravity cell/cofferdam installed offshore in the vicinity of each landfall.

Once across Jones Beach Island the cable would enter Great South Bay using HDD, similar to that used at the West Gilgo beach landfall. Given the distance across Great South Bay from the landward HDD point on the north side of West Gilgo Beach (just north Unqua Corinthian Yacht Club and West Gilgo Beach Association Basin) the most feasible installation method for the cable would be jet plow embedment. To minimize impacts to sensitive resources the route within Great South Bay would follow the Amityville Cut, which is a maintained channel oriented north-south from the State Boat Channel landward of Jones Beach Island to East-West Channel on the north side of Great South Bay.

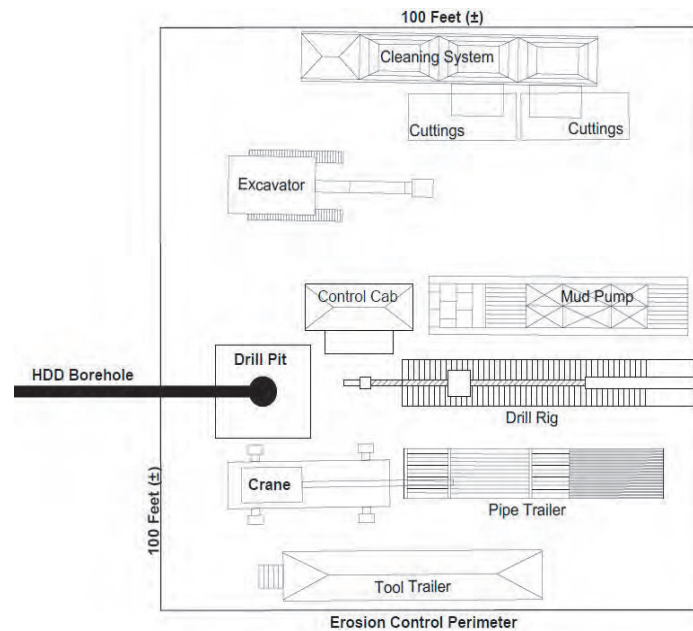
This route also crosses the State Boat Channel and the East-West Channel. If targeted burial depths of the cable within and across three navigation channels cannot be achieved using jet plow embedment, dredging a trench may be required. This circumstance is not common since the jet plow embedment can usually reach burial depths of 12 feet below the bottom.

A second landfall on the mainland would be located at Caples Memorial Beach/Park, a locally-owned beach and recreation area in village of Amityville in Town of Babylon. Another HDD operation at this landfall location would be required to transition the subsea cable from Great South Bay to the mainland.

Details of likely installation methods for the cable crossing of approximately 2.9 mile of Great South Bay are provided below.

6.1 Horizontal Directional Drill (Landfall)

HDD is a trenchless installation method that involves drilling a subterranean borehole between pre-designated entry and exit points within which protective conduits and the transmission cable are installed. The HDD operations at the landfall (see Graphic 1) would facilitate the transition of the HVDC land cable to the subsea cable. A temporary gravity cell/cofferdam structure would be installed in approximately 8 feet of water and its enclosed area would be mechanically dredged to provide sufficient depth to accept the land-side HDD bore hole and conduit. The HDD process would involve the use of inert drilling fluid to transport drill cuttings to the surface, to aid in stabilization of the surrounding borehole soils, and to provide lubrication for the HDD drill. The drilling fluid is composed primarily of water



Graphic 1. Typical; HDD Operations at Landfall

and a small amount of bentonite clay. The bentonite clay is a naturally occurring mineral compound that is not environmentally harmful.

6.2 Dredging and Temporary Gravity Cell/Cofferdam

To accommodate the HDD operations at each landfall end of the subsea cable, mechanical dredging of a temporary gravity cell/cofferdam would be necessary to allow the jet plow to receive the subsea cable from the HDD pull pit. The temporary gravity cell/cofferdam would be installed in South Great Bay at the end point of the landfall HDD conduit exit point and would remain in place until jet plow embedment installation of the subsea cable is complete.

The temporary gravity cell/cofferdam walls would be constructed using typical marine grade steel sheet pile walls driven vertically into the seabed by a barge mounted lift and hammer crane. The temporary gravity cell/cofferdam would be approximately 300 square feet and would be open at the in-water end during subsea cable installation to allow for manipulation of the HDD conduits and access for the jet plow device. Natural seabed sediments contained within the cofferdam would be mechanically dredged from this open water gravity cell/cofferdam to expose the seaward end of the borehole.

After installation of the subsea cable is complete, the temporary gravity cell/cofferdam would be removed. The preference would be to temporarily store the dredged material on a support barge and then utilize as backfill to restore the seabed and bottom contours within the temporary gravity cell/cofferdam area. If NYSDEC determines that this would not be an acceptable use, then imported clean backfill material would be used to restore the seabed and bottom contours to preconstruction grades. In this case, the dredged material from the temporary gravity cell/cofferdam would also be disposed of at an acceptable upland disposal site.

6.3 Subsea Cable Installation

Jet plow embedment simultaneously lays and buries the subsea cable bundle and ensures the placement of the cable at the target burial depth with minimum bottom disturbance and with the fluidized sediment settling back into the trench. The ease of installation, the lack of the need to dredge and remove sediments, and the minimal environmental impacts make jet plow embedment the preferred method of subsea cable installation.

Given the shallow waters within Great South Bay where a cable transportation and installation vessel cannot gain access (compared to offshore), the cable would be installed using a cable-lay barge. The barge equipped with the jetting blade would be maneuvered with tugs. To transition the cable into the temporary gravity cell/cofferdam, divers might also assist in jetting the cable.

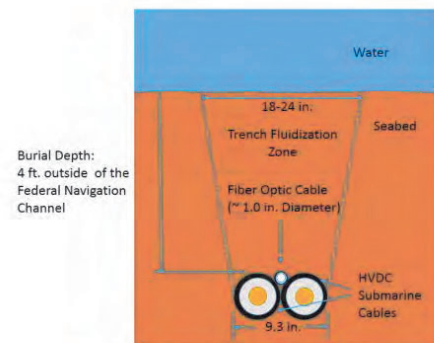
As shown in Graphic 2, the jet plow is a skid/pontoon-mounted device and has no propulsion system of its own. Instead, it depends on the cable vessel/barge for propulsion. The jetting blade is fitted with hydraulic pressure nozzles, which direct pumped seawater downward and backwards, to fluidize the seabed sediments to create a “trench” approximately 18-24 inches wide such that the jet plow can advance in the direction of the cable laying and embed the cable in the seabed. The cable-lay barge would be equipped with water pumps that take water from just below the water surface to provide high pressure seawater to the jet plow device via an umbilical. The hydraulic pressure nozzles create a direct downward and backward “swept flow” force inside the trench. This



Graphic 2. Jet Plow used for Subsea Cable Burial

provides a down and back flow of re-suspended sediments within the trench, thereby “fluidizing” the *in situ* sediment column as it progresses along the predetermined subsea cable route such that the cable settles into the trench under its own weight to the planned depth of burial. The jet plow’s hydrodynamic forces do not work to produce an upward movement of sediment into the water column since the objective of this method is to maximize gravitational replacement of re-suspended sediments within the trench to bury or “embed” the cable as the jet plow progresses along its route. This method of laying and burying cable simultaneously would ensure the placement of the subsea cable at the target burial depth with minimal bottom disturbance and the majority of the fluidized sediment settling back into the trench.

The subsea cable in Great South Bay would be buried to specific subsurface depths (approximately 4 feet below present bottom) to avoid conflicts with general navigation in the waterway, avoid potential mechanical damage to the cable from vessel transit or anchoring, and minimize near surface impacts to aquatic resources. Jet plow embedment is the most effective and least environmentally damaging method when installing underwater electric transmission cables, compared with traditional mechanical dredging and trenching. A typical cross-section of the subsea cable installation is provided as Graphic 3.



Graphic 3. Subsea Cable System Burial Profile

Mechanical dredging in the navigation channels would involve the physical removal and disposal of seabed sediments from the trench footprint. While mechanical dredging could be used to install the cable within the Bay to the required depths, it would require the mobilization of a large dredge operation for an extended period and would result in significantly greater environmental impacts than the preferred hydraulic jet plow method. The mechanical dredge would be in place on the water for a much longer period of time than the jet plow with much greater impacts to commercial and recreational marine navigation. As compared to the preferred jet plow embedment method, dredging would involve direct impacts to much greater areas of the seabed

and larger volumes of sediments, significantly increasing suspended sediment concentrations and turbidity in the water column. For these reasons, mechanical dredging is not the preferred subsea cable installation method and would be limited to those areas where jet plow embedment of the cable is not feasible.

7.0 TIDAL AND FRESHWATER WETLAND RESOURCES

NYSDEC Request

Quantification and assessment of impacts to wetlands and other waters of the U.S. along the Great South Bay Alternative route, including a description of each wetland type and functional analysis.

7.1 Existing Tidal and Freshwater Wetland Resources

Both tidal and freshwater wetland resource areas occur within and along the Great South Bay Alternative Route. These wetland resource areas mapped by both the NYSDEC and the United States Fish and Wildlife Service (USFWS) are depicted on Figures 5 and 6, respectively. The Great South Bay Alternative Route is located primarily within tidal areas mapped as littoral zone (NYSDEC) and estuarine (USFWS) that generally include lands under tidal waters which are usually deeper than 6.0 feet below MLW and lack vegetation. Eelgrass beds along the route are discussed in Section 10. The other tidal wetland habitats within Great South Bay in the vicinity of the route include high salt marsh, intertidal salt marsh, coastal shoals, bars, and mudflats. These tidal wetland habitats provide expansive and high-quality habitat for a variety of marine, estuarine, and coastal animal and plant species, and provide important regionally-important recreational and commercial resources (NYSOPD 2008a). The tidal habitats along the subsea cable route within Great South Bay and the functions and values they support are discussed in more detail in Sections 4, 9, 10 and 11.

The land cable associated with the Great South Bay Alternative Route would follow existing roadways from the landfall at Caples Memorial Beach/Park in village of Amityville north to the Road Converter Station in Huntington, NY. State- and federally-mapped freshwater wetlands along the land cable route are depicted on Figures 5 and 6, respectively. The land cable route passes through high-developed residential and commercial areas of Suffolk County; accordingly, relatively few mapped wetlands are present along the route. The land cable route would encroach into the adjacent area of a marsh complex associated with the headwaters of Amityville Creek.

7.2 Potential Environmental Impacts

The potential impacts to wetlands of installing the subsea cable and construction of the temporary gravity cells/cofferdams with Great South Bay are expected to be localized and temporary, as further discussed in Section 8. The tidal waters within Great South Bay along the route are primarily unvegetated, except for the eelgrass beds (see discussion in Section 10).

It is anticipated that there would be no direct alteration of freshwater wetlands or associated waterbodies along the land cable route since the cable would be installed within existing roadways and no wetland crossings are expected to be necessary. Appropriate erosion controls would be employed in areas of active trenching to avoid discharge of stormwater runoff and sedimentation to freshwater wetlands adjacent to the route.

8.0 SUSPENDED SEDIMENT AND TRANSPORT

NYSDEC Request

An estimate of the sediment to be released during the HVDC cable installation and its effect on marine resources.

8.1 Increases in Ambient Levels of Suspended Sediment

The installation of the temporary gravity cells/cofferdams associated with the use of HDD technology for the landfall transitions (at West Gilgo Beach and Caples Memorial Beach) would generate temporary and localized increases in turbidity. Details on the construction of the temporary gravity cells/cofferdams is provided in Section 6. Dredging would be confined within the limits of the temporary gravity cells/cofferdams in the vicinity of each landfall, which would limit sediment dispersion outside of the immediate dredge area. No sediment controls would be deployed during this process.

As discussed in Section 6, jet plow embedment of subsea cables generates orders of magnitude less suspended sediment and turbidity compared to conventional mechanical dredging or gravity plow trenching methods. Jet plowing the cable bundle to the target burial depth results in minimum bottom disturbance and the majority of fluidized sediment settling vertically back into the jet plow trench once the cable is laid on the bottom of the trench. The estimated temporary bottom disturbance along the route across Great South Bay from jet plowing would be approximately 112,000 square feet, assuming an 8-foot disturbance width from the jet plow pontoons and plow share. Temporarily re-suspended *in situ* sediments (approximately 75%) are largely contained within the vertical limits of the trench during jet plow embedment. It is estimated that approximately 1,700 cubic yards of sediment has the potential to exit the trench vertically into the water column to then be influenced by natural tidal flows and dispersed and deposited under natural sediment transport conditions occurring in the area of the Great South Bay. Any suspended sediments that disperse beyond the limits of the incised jet plow trench have been shown to settle out quickly in the immediate vicinity of the trench on the adjacent seabed. Based on modeling conducted from similar projects, in most cases, suspended sediment concentrations were predicted to return to ambient conditions within 1 to 4 hours and in almost all cases within 24 hours after the passage of the jet plow.

8.2 Potential Environmental Impacts

In-water construction activities including dredging, jet-plowing, vessel movements, and gravity cell/cofferdam construction, would result in a temporary and localized impact to water quality and aquatic resources in Great South Bay that can be avoided by the Preferred Alternative. Specific impacts to marine resources within Great South Bay along the cable area corridor for the Great South Bay Alternative Route are discussed in other sections of this report.

9.0 RARE, THREATENED, AND ENDANGERED SPECIES

NYSDEC Request

An evaluation of RTE species along the Great South Bay Alternative route and measures to avoid impacts.

9.1 Existing Rare, Threatened & Endangered Species

As shown in Figure 7, most of the Great South Bay Alternative Route from West Gilgo Beach landfall to the northern reaches of Great South Bay falls within an area mapped by the NYSDEC as habitat for state-listed

and protected animal and plant species. An additional mapped habitat of state-listed animal species is located along the land cable route in the vicinity of the Ruland Road Converter Station. The USFWS has identified multiple federally-listed animal and plant species along the Great South Bay Alternative Route, primarily in the vicinity of Jones Beach Island. Table 1 provides a summary of the state- and federally-listed species which may occur along the Great South Bay Alternative Route.

Table 1. State- and Federally-Listed Species Potentially Occurring along the Great South Bay Alternative Cable Route

Common Name	Scientific Name	Federal Status	State Status
Birds			
Piping plover	<i>Charadrius melodus</i>	Threatened	Endangered
Roseate Tern	<i>Sterna dougallii</i>	Endangered	Endangered
Red Knot	<i>Calidris canutus rufa</i>	Threatened	
Least Tern	<i>Sterna antillarum</i>		Threatened
Northern Harrier	<i>Circus cyaneus</i>		Threatened
Common Tern	<i>Sterna hirundo</i>		Threatened
Short-Eared Owl	<i>Asio flammeus</i>		Endangered
Black Rail	<i>Laterallus jamaicensis</i>		Endangered
Osprey	<i>Pandion haliaetus</i>		Special Concern
Black Skimmer	<i>Rynchops niger</i>		Special Concern
Seaside Sparrow	<i>Ammodramus maritimus</i>		Special Concern
Peregrine Falcon	<i>Falco peregrinus</i>		Endangered
Mammals			
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened	Threatened
Reptiles			
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered	Endangered
Green Sea Turtle	<i>Chelonias mydas</i>	Threatened	Threatened
Hawksbill turtle	<i>Eretmochelys imbricate</i>	Endangered	Endangered
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered
Loggerhead turtle	<i>Caretta</i>	Threatened	Threatened
Eastern mud turtle	<i>Kinosternon subrubrum</i>		Endangered
Plants			
Sandplain Gerardia	<i>Agalinis acuta</i>	Endangered	Endangered
Seabeach Amaranth	<i>Amaranthus pumilus</i>	Threatened	Threatened
Barratt's Sedge	<i>Carex barrattii</i>		Endangered
Slender Nutrush	<i>Scleria minor</i>		Endangered
Low St. John's Wort	<i>Hypericum stragulum</i>		Endangered
Pixies	<i>Pyxidantha barbulate</i>		Endangered
Slender Marsh-Pink	<i>Sabatia campanulata</i>		Endangered
Yellow Milkwort	<i>Polygala lutea</i>		Endangered

Common Name	Scientific Name	Federal Status	State Status
Button Sedge	<i>Carex bullata</i>		Endangered
Angled Spikerush	<i>Eleocharis quadrangulata</i>		Endangered
Long-Tuberclad Spikerush	<i>Eleocharis tuberculosa</i>		Threatened
Few-Flowered Nutrush	<i>Scleria pauciflora</i>		Endangered
Weak Rush	<i>Juncus debilis</i>		Endangered
Crested Yellow Orchid	<i>Platanthera cristata</i>		Endangered
Purple Milkweed	<i>Asclepias purpurascens</i>		Threatened
Swamp Sunflower	<i>Helianthus angustifolius</i>		Threatened
Leggett's Pinweed	<i>Lechea pulchella</i> var. <i>moniliformis</i>		Endangered
Shrubby St. John's-Wort	<i>Hypericum prolificum</i>		Threatened
Sandplain Wild Flax	<i>Linum intercursum</i>		Threatened
Southern Yellow Flax	<i>Linum medium</i> var. <i>texanum</i>		Threatened
Golden Dock	<i>Rumex maritimus</i> var. <i>fueginus</i>		Endangered
Collins' Sedge	<i>Carex collinsii</i>		Endangered
Marsh Straw Sedge	<i>Carex hormathodes</i>		Threatened
Red-Rooted Flat Sedge	<i>Cyperus erythrorhizos</i>		Rare
Whip Nut Sedge	<i>Cyperus erythrorhizos</i>		Endangered
Southern Twayblade	<i>Neottia bifolia</i>		Endangered
Spring Ladies' Tresses	<i>Spiranthes vernalis</i>		Endangered
Nuttall's Lobelia	<i>Lobelia nuttallii</i>		Rare
Illinois Pinweed	<i>Lechea racemulosa</i>		Rare
Slender Pinweed	<i>Lechea tenuifolia</i>		Threatened
Comb-Leaved Mermaid Weed	<i>Proserpinaca pectinata</i>		Threatened
Small Floating Bladderwort	<i>Utricularia radiata</i>		Threatened

Birds

Several federal- and state-listed bird species have been documented in habitats in and around Great South Bay. Piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), roseate tern (*Sterna dougallii dougallii*), common tern (*Sterna hirundo*), least tern (*Sterna antillarum*), black skimmer (*Rynchops niger*), and peregrine falcon (*Falco peregrinus*) have been documented in the area and primarily occur in beach and dune habitats along West Gilgo beach. Some of these species, including piping plover, the three terns, and black skimmer may nest in beach/dune habitats on Jones Beach. Red knots utilize beach, dune, and mudflat areas during spring and fall migration but do not nest in New York; peregrine falcons may be found in the area year-round and may use open habitats along the barrier beach as foraging areas (NYSOPD 2008a).

Other federal- and state-listed bird species may occur in marshes in and around Great South Bay, including northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), black rail (*Laterallus jamaicensis*), seaside sparrow (*Ammodramus maritimus*), and osprey (*Pandion haliaetus*). Both northern harrier and short-eared owl occur in Great South Bay during the winter, and northern harriers

nest in the area at relatively high densities. Osprey are found in the area during the summer months, and use the highly productive shallow open waters and marshes of the Bay for foraging and nesting habitat. Great South Bay is also the only area in New York where black rail nesting activity has been documented, and seaside sparrows have been known to nest in saltmarsh habitats around Gilgo Beach (NYSOPD 2008a).

Northern Long-eared Bat

Northern long-eared bats (*Myotis septentrionalis*) typically inhabit forested areas where they hunt insects nocturnally and roost in trees during daylight hours. Northern long-eared bats hibernate in caves or abandoned mines during winter months (NYSDEC 2018a).

Turtles

Eastern mud turtles (*Kinosternon subrubrum*) inhabit fresh or brackish water habitats characterized by shallow, soft-bottomed, slow moving waters with abundant vegetation. This species has been documented on the barrier islands in Great South Bay (NYSOPD 2008a). Sea turtles found in the coastal waters seaward of West Gilgo Beach are discussed in Section 11.

Plants

Two federally-listed plant species, seabeach amaranth (*Amaranthus pumilus*) and sandplain gerardia (*Agalinis acuta*), as well as over two dozen state-listed plant species have been documented in habitats of Great South Bay (NYSOPD 2008a). Most listed plant species potentially occurring in the area (including the two federally-listed species) inhabit the open, sandy habitats found in the barrier beach/dune complex of West Gilgo Beach and Jones Beach Island, in freshwater marshes, or in saltmarshes within and around Great South Bay.

9.2 Potential Environmental Impacts

Construction of the Great South Bay Alternative Route has the potential to have either direct or indirect impacts on rare, threatened, and endangered species or their habitats in and around the area of subsea cable route installation and associated construction and vessel activities. Potential impacts to these species would only occur during the installation of the cable system, rather than during the operational phase of the project since the cable will be buried below the seabed. In general, impacts would most likely be minor and temporary and would primarily be associated with disturbance due to the presence of construction noise, vehicle, equipment, and personnel. Disturbance of nesting bird species during cable installation could lead to a loss of reproductive output by increasing the likelihood of predation, exposure, and stress. The use of HDD technology to cross West Gilgo Beach and scheduling construction in fall/winter would help to avoid impacts to federally- and state-listed beach nesting birds including piping plover, terns, and black skimmer, as well as marsh-nesting bird species such as seaside sparrow and black rail, as discussed in Section 4. The use of HDD technology for transitioning from land to the Bay would avoid altering the shorelines that may support listed species, especially plants, which may occur in these habitats

Temporary increases in turbidity within Great South Bay resulting from jet plow embedment of the cable could also negatively impact listed aquatic animal or plant species or other listed species which feed on aquatic life, such as osprey, red knot, black skimmer, and terns. However, turbidity increases would be expected to be temporary and would return to background levels upon completion of jet plow operations in

a particular area, as discussed in Section 8. Impacts to northern long-eared bat would not be expected since the cable installation would not involve tree clearing or work in or near a hibernaculum.

10.0 SUBAQUATIC VEGETATION – EELGRASS BEDS

NYSDEC Request

Location and assessment of Eel Grass Beds along the Great South Bay Alternative route and efforts to avoid them.

10.1 Existing Eelgrass Beds

Subaquatic seagrasses provide critical seasonal spawning and foraging habitat for many fish, shellfish, and waterfowl species, including commercially and recreationally important fishery species such as winter flounder (*Pseudopleuronectes americanus*), Bay scallop (*Argopecten irradians*), and hard clams (*Mercenaria mercenaria*). They also provide ecological services including nutrient cycling and suspended sediment deposition.

Great South Bay-West has extensive areas of existing seagrass beds covering over 10,000 acres. This subaquatic vegetation is made up predominately by eelgrass (*Zostera marina*) with some widgeon grass (*Ruppia maritima*) (NYSOPD 2008a). Figure 8 shows mapped eelgrass beds along the majority of the Great South Bay in the area of the Alternative Route. Though eelgrass beds are prevalent in the route area, they do not occur within the Amityville Cut likely due to boat wake influence, and where much of the route would be located. However, after exiting the Amityville Cut in the northern area of the Bay, the Great South Bay Alternative Route traverses three mapped eelgrass beds before making landfall at James Caples Memorial Park/Beach.

10.2 Potential Environmental Impacts

Construction of the Great South Bay Alternative Route would directly alter (destroy) approximately 3,200 square feet of existing eelgrass beds along the northern end of the route through Great South Bay. It may be possible to avoid crossing approximately 400 feet of the eelgrass bed along the Caples Memorial Beach by ending the HDD operations further into the Bay. Optimizing the route and making slight deviations might also result in reducing the eelgrass impact footprint. However, even with these adjustments, it would be expected that existing eelgrass beds would be destroyed or affected.

Any indirect effects to eelgrass beds associated with increases in suspended sediment from installation of the subsea cable will be localized and temporary. The existing eelgrass beds adjacent to the construction and within the area of the turbidity plume are not expected to become buried or suffocated by elevated suspended sediment. Given the natural variation of suspended sediments in Great South Bay under ambient conditions, the resuspension of bottom sediment that would result from construction of the Project is not anticipated to result in adverse impacts to eelgrass beds.

Nevertheless, direct and indirect impacts to existing subaquatic vegetation within Great South Bay can be avoided by using the Preferred Alternative.

11.0 MARINE RESOURCES

NYSDEC Request

Location and assessment of shellfish beds, fish, and other marine resources along the Great South Bay Alternative route and efforts to avoid them.

11.1 Existing Shellfish Beds

The entirety of Great South Bay Alternative Route falls within areas designated as a shellfish growing areas, of which the southernmost portion is designated as “Seasonally Certified” and the northernmost portion is designated as “Uncertified” (Figure 9). State Law prohibits the harvesting of shellfish from Uncertified Areas. Recreational and commercial shellfishing takes place throughout much of the Bay; blue crab (*Callinectes sapidus*) are abundant and other shellfish including soft clams (*Mya arenaria*), ribbed mussels (*Geukensia demissa*), and hard clams (*Mercenaria mercenaria*) are also present. The Bay is also used for sport fishing, waterfowl hunting, and shellfish aquaculture (NYSOPD 2008a).

The populations of harvested shellfish species of Great South Bay have undergone significant changes over the past 40 years. Hard clams were once abundant in the Bay. However, the population has exhibited a dramatic decrease since the 1970’s, and quahogs have only been found in very low numbers in the Bay since the 1990’s (Tanski et al. 2001).

11.2 Existing Fish

Great South Bay-West supports a wide diversity of finfish. NYSDEC conducted annual surveys of fish in the Bay over eight years and found 85 species of fish, with 40 species occurring regularly. The majority (90%) of these species consisted of silversides (*Menidia* spp.), killifish (*Fundulus* spp.), menhaden (*Brevoortia tyrannus*), and bay anchovy (*Anchoa mitchilli*). The abundance of these forage species attracts larger predatory species, including commercially and recreationally important species such as summer flounder (*Paralichthys dentatus*), winter flounder (*Pleuronectes americanus*), bluefish (*Pomatomus saltatrix*), striped bass (*Morone saxatilis*), weakfish (*Cynoscion regalis*), tomcod (*Microgadus tomcod*), and tautog (*Tautoga onitis*) (NYSOPD 2008a, USFWS 1997).

11.3 Essential Fish Habitat Species

The Magnuson-Stevens Fishery Conservation and Management Act and the 1996 Sustainable Fisheries Act mandate that NOAA identify and protect important marine and anadromous fish habitat. Essential Fish Habitat (EFH) is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 U.S.C. 1802 § 3). The Magnuson Stevens Act requires consultation with NOAA National Marine Fisheries Service (NOAA Fisheries) for proposed activities that may “adversely affect” EFH. An “adverse effect” is defined as any impact that reduces quality and/or quantity of EFH, including direct, indirect, individual, cumulative, or synergistic impacts.

A list of species with EFH designated within the Great South Bay is provided in Table 2. A total of 20 species of fish were determined to have EFH designated for at least one life stage. However, project-specific habitat conditions may indicate that EFH does not exist for some of the listed species or life stages in the Project Area.

Table 2. Summary of Specific Life Stage EFH Designations for Species in the Vicinity of the Great South Bay Alternative Cable Route

Species	Eggs	Larvae	Juveniles	Adults	Spawning Adults
American plaice (<i>Hippoglossoides platessoides</i>)			S	S	
Atlantic butterfish (<i>Peprilus triacanthus</i>)	S	S	S	S	
Atlantic mackerel (<i>Scomber scombrus</i>)	S	S	S	S	
Atlantic salmon (<i>Salmo salar</i>)				S	
Atlantic sea herring (<i>Clupea harengus</i>)			S	S	
black sea bass (<i>Centropristus striata</i>)				S	
bluefin tuna (<i>Thunnus thynnus</i>)			X		
bluefish (<i>Pomatomus saltatrix</i>)			M,S	M,S	
cobia (<i>Rachycentron canadum</i>)	X	X	X	X	
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X	
pollock (<i>Pollachius virens</i>)			S		
sandbar shark (<i>Carcharhinus plumbeus</i>)			X	X	
scup (<i>Stenotomus chrysops</i>)			S	S	
skipjack tuna (<i>Katsuwonus pelamis</i>)				X	
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X	
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a			
summer flounder (<i>Paralichthys dentatus</i>)			M,S	M,S	
white shark (<i>Carcharodon carcharias</i>)			X		
windowpane flounder (<i>Scopthalmus aquosus</i>)	M,S	M,S	M,S	M,S	M,S
winter flounder (<i>Pleuronectes americanus</i>)	M,S	M,S	M,S	M,S	M,S

M = Mixed waters/estuary (0.5 < salinity < 25.0%)
S = Saline (salinity > 25%)

Sources:

https://www.greateratlantic.fisheries.noaa.gov/hcd/STATES4/conn_li_ny/40307320.html
<https://www.habitat.noaa.gov/protection/efh/efhmapper/>

11.4 Other Marine Resources

Marine mammals and sea turtles can also be found in Great South Bay-West. Harbor seals (*Phoca vitulina*) are found frequently during the winter and grey seals have also been sighted. Sea turtles that are found in the Bay include the endangered Kemp's ridley sea turtle (*Lepidochelys kempi*), threatened green sea turtle (*Chelonia mydas*), and threatened loggerhead turtle (*Caretta caretta*) (NYSOPD 2008a, USFWS 1997). Sea turtles are highly migratory and typically occur in coastal waters of New York during the summer months into late November (NYSDEC 2018b).

11.5 Potential Environmental Impacts

Potential impacts to finfish and finfish habitat from installation of the subsea cable system would be localized and temporary, resulting primarily from direct and indirect seabed sediment disturbance and TSS. Juvenile and adult finfish species are not expected to become buried or suffocated by elevated suspended sediment



in the vicinity of mobile jet plow operations given the slow rate at which the jet plow advances, their own mobility, and the limited nature of the sediment disturbance and deposition associated with jetting activities. Any demersal eggs or larvae in the immediate vicinity of the jet plow or gravity cell/cofferdam dredging would experience mortality and nearby organisms may experience localized increases in physical abrasion or burial. Given the natural variation of suspended sediments in Great South Bay under ambient conditions, the resuspension of bottom sediment that would result from construction of the Project is not anticipated to result in adverse impacts to finfish species. The area affected by jet plow embedment and gravity cell/cofferdam dredging along the Great South Bay Alternative Route is small when compared to the surrounding habitat of the Great South Bay. Therefore, sediment resuspension caused by the Project will not result in population-level effects on marine resources.

The installation of the subsea cable in Great South Bay would employ a series of other mitigation measures, most notably complying with established fishery time of year restrictions to avoid or minimize potential project impacts to these bay fisheries in the vicinity of the project area during installation activities.

Once installed, the operational subsea cable system would be expected to have minimal impact to finfish resources since it would be buried at least 4 feet below the present seabed bottom. The buried cable would not create a physical barrier that could interfere with fish or shellfish migration or their use of existing aquatic habitats or nursery areas. Avoidance is the key mitigation measure. Magnetic fields from the HVDC cable system drop off rapidly with distance from the cable and therefore any exposure is limited.

To minimize impact to marine mammals and sea turtles, a detailed shipboard monitoring protocol would be developed and approved with NOAA and NYSDEC prior to commencement of construction, which would include utilizing NOAA-certified Protected Species Observers on construction vessels and observation of reduced speed requirements among other self-imposed guidelines. NOAA and other regulatory agencies would be consulted in the process of developing observation and avoidance protocols to ensure the best practices are used to minimize the potential for impact to these species. For these reasons, potential impacts to marine mammals and sea turtles would be expected to be negligible.

12.0 MITIGATION MEASURES

NYSDEC Request

Discussion of proposed mitigation measures for impacts associated with the installation of the HVDC cable along the Great South Bay Alternative route.

This section provides a general listing of the possible mitigation measures that could be implemented to avoid, minimize or restore potential environmental impacts associated with the construction of the Great South Bay Alternative Route.

- General avoidance of impacts would be achieved by routing the cable within existing channels within Great South Bay (e.g., Amityville Cut)
- Seabed sediment disturbance would be minimized by the use of low-impact jet plow embedment methods to bury the subsea cable over much of the in-water segments of the Great South Bay Alternative Route.
- The use of HDD technology at the landfalls would avoid direct impacts to shoreline features, coastal habitats and nearshore bottom conditions by drilling under the shoreline and Bay rather than directly dredging or excavating an open-cut trench across the coastal feature to reach Great South Bay.
- Mechanical dredging would be confined to the areas of the temporary gravity cells or cofferdams in the vicinity of each shoreline landfall, which would limit sediment dispersion outside of the immediate dredge area.
- The HDD operations would most likely include monitoring of potential fracture or overburden breakout of the down-hole water/bentonite slurry to minimize the potential of drilling fluid breakout within the nearshore areas of the Bay.
- Burial of the cable a minimum of 4 feet below the seabed's present bottom in the Bay would minimize the disturbance to existing commercial fishing and shellfish fishing operations.
- The use of HDD technology to cross West Gilgo Beach and scheduling construction in fall/winter would help to avoid impacts to federally- and state-listed beach nesting birds including piping plover, terns, and black skimmer, as well as marsh-nesting bird species such as seaside sparrow and black rail.
- The use of HDD technology for transitioning from land to the Bay would avoid altering the shorelines that may support listed species, especially plants, which may occur in these habitats.
- Loss of eelgrass beds could be compensated by planting and monitoring new beds within the Bay.
- Poseidon would work with regulators and resource agencies as appropriate to identify reasonable time of year restrictions (non-work period), utilize low impact construction techniques (i.e., HDD), and minimize construction schedules to ensure that the potential impacts to threatened, endangered, and protected species will be negligible to minor.



- The use of an Environmental Monitor during cable installation activities could also help to avoid or minimize impacts to sensitive habitats by monitoring the area of active construction for said species and implementing protective measures.

SUMMARY AND CONCLUSIONS

- The Great South Bay Alternative Route, which involves an in-water crossing of Great South Bay, represents an alternative that potentially could be accomplished with minimization or avoidance of aquatic resource and water quality impacts with proper installation planning, timing and mitigation. However, much if not all of these impacts can be entirely avoided using the Preferred Alternative.
- Great South Bay represents a highly sensitive and protected coastal and aquatic resource environment that is proven to be very important to local area fishing, recreation, aquatic habitat, and coastal navigation within a very shallow and protected barrier beach back bay area.
- Avoidance of the need for an aquatic resource based subsea cable installation such as the Preferred Alternative that uses an existing land-based crossing to interconnect with the Ruland Road HVDC Substation is the best environmental impact mitigation since it simply avoids potential impacts to Great South Bay.

13.0 REPORT REFERENCES

- Guerra-García, J.M., J. Corzo and J.C. García-Gómez. 2003. Short-term benthic recolonization after dredging in the harbour of Ceuta, North Africa. *Marine Ecology* 24(3):217-229.
- MacKenzie, C.L., Jr. 2003. Comparison of invertebrate abundances in four bays of the northeastern United States: two bays with sparse quahogs and two bays with abundant quahogs. Northeast Fisheries Science Center Reference Document 03-10; 25 p. Available from National Marine Fisheries Service, 166 Water St., Woods Hole, MA 02543-1026.
- McCabe, G.T., S.A. Hinton, and R.L. Emmett. 1998. Benthic invertebrates and sediment characteristics in a shallow navigation channel of the lower Columbia River, before and after dredging Northwest Science 72(2):116-126.
- NYSDEC. 2018a. Northern long-eared bat fact sheet. Accessed online June 2018 at: <https://www.dec.ny.gov/animals/106713.html>
- NYSDEC. 2018b. Sea turtles of New York fact sheet. Accessed online June 2018 at: <https://www.dec.ny.gov/animals/112355.html>
- [NYSDEC] New York State Department of Environmental Conservation, Division of Marine Fisheries. 2016. Survey of Recreational blue Crabbing in the New York Marine & Coastal District. https://www.dec.ny.gov/docs/fish_marine_pdf/bluecrabreport2016.pdf.
- [NYSERDA] New York State Offshore Wind Master Plan Cable Landfall Permitting Study Final Report. November 2017. Ecology and Environment Engineering, PC. New York, New York. <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25f-Cables-Pipelines-and-Other-Infrastructure.pdf>
- [NYSOPD] NY State Department of State, Office of Planning and Development. 2008a. "Coastal Fish and Wildlife Habitat Assessment Form, Great South Bay - West." Significant Coastal Fish and Wildlife Habitats. Accessed June 12, 2018. <https://www.dos.ny.gov/opd/programs/consistency/scfwhabitats.html>.
- [NYSOPD] NY State Department of State, Office of Planning and Development. 2008b. "Coastal Fish and Wildlife Habitat Assessment Form, Jones Beach East." Significant Coastal Fish and Wildlife Habitats. Accessed June 12, 2018. <https://www.dos.ny.gov/opd/programs/consistency/scfwhabitats.html>.
- Stone, S.L., T.A. Lowery, J.D. Field, C.D. Williams, D.M. Nelson, S.H. Jury, M.E. Monaco, and L. Andreasen. 1994. Distribution and abundance of fishes and invertebrates in mid-Atlantic estuaries. ELMR Rep. No. 12. National Oceanic and Atmospheric Administration/NOS Strategic Environmental Assessments Division, Silver Spring, MD. 280 p.
- Tanski, J., Bokuniewicz, H., Schlenk, C., Cerrato, R., Conover, D., Cosper, E., DiLorenzo, J., and S. Findlay. 2001. Impacts of Barrier Island Breaches on Selected Biological Resources of Great South Bay, New York. New York Sea Grant Extension Program. <http://www.seagrant.sunysb.edu/cprocesses/pdfs/BarrierBreaches.pdf>



[USFWS] US Fish and Wildlife Service. 1997. "Significant habitats and habitat complexes of the New York Bight watershed." USFWS Southern New England–New York Bight Coastal Ecosystems Program, Charlestown, Rhode Island. https://nctc.fws.gov/pubs5/web_link/text/gsb_form.htm

[USGS] United States Geologic Survey. 2018. usSEABED Database. Accessed June 12, 2018 <https://coastalmap.marine.usgs.gov/FlexWeb/national/usseabed/>

Van Dolah, R.F., D.R. Calder, and D.M. Knott. 1984. Effects of dredging and open-water disposal on benthic macroinvertebrates in a South Carolina estuary. *Estuaries* 7(1):28-37.