Deepwater Wind South Fork, LLC

South Fork Export Cable

Exhibit 4

Environmental Impact

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EXHIBIT 4: ENVIRONMENTAL IMPACT

4.1 Introduction

Deepwater Wind South Fork, LLC (DWSF or the Applicant) is proposing to construct, operate, and maintain the South Fork Wind Farm (SFWF) and the South Fork Export Cable (SFEC).

- SFWF: includes up to 15 wind turbine generators (WTGs, turbines) with a nameplate capacity of 6 to 12 megawatts (MW) per turbine, submarine cables between the WTGs (inter-array cables), and an offshore substation (OSS), all of which will be located within federal waters on the Outer Continental Shelf (OCS), specifically in the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486 (Lease Area), approximately 19 miles (30.6 kilometers [km], 16.6 nautical miles [nm]) southeast of Block Island, Rhode Island, and 35 miles (56.3 km, 30.4 nm) east of Montauk Point, New York. The SFWF also includes an O&M facility that will be located onshore at Montauk in East Hampton, New York.
- SFEC: an alternating current (AC) electric cable (138 kilovolts [kV]) that will connect the SFWF to the existing mainland electric grid in East Hampton, New York. The SFEC includes both offshore and onshore segments.
  - SFEC-OCS: the submarine segment of the export cable buried beneath the seabed within federal waters on the OCS from the OSS to the boundary of New York State territorial waters.
  - SFEC-New York State (NYS): the submarine segment of the export cable buried beneath the seabed within state territorial waters from the boundary of New York State waters (three nm offshore) to a sea-to-shore transition vault located in the Town of East Hampton on Long Island, Suffolk County, New York. The SFEC-NYS includes the sea-to-shore transition.
  - SFEC-Onshore: the terrestrial underground segment of the export cable from the sea-to-shore transition vault to the SFEC-Interconnection Facility where the SFEC will interconnect with the Long Island Power Authority (LIPA) electric transmission and distribution system in the Town of East Hampton, New York.

– SFEC-Interconnection Facility: a new onshore facility, primarily consisting of a transformer and a 69 kV interconnection cable that will connect to the 69 kV bus in the existing LIPA East Hampton Substation in the Town of East Hampton, New York.

The SFEC-NYS, SFEC-Onshore, and SFEC-Interconnection Facility are subject to Article VII review and will hereafter be referred to as "the Project".

This Exhibit addresses the requirements of Title 16 of the New York Codes, Rules, and Regulations (NYCRR) § 86.5: Environmental Impact.

For additional information pertaining to location of facilities, see Exhibit 2: Location of Facilities. Additional information pertaining to design details and construction techniques are included in Exhibit 5: Design Drawings, Exhibit E-2: Other Facilities, and Exhibit E-3: Underground Construction. In order to provide consistency with supporting appendices, measurements within this Exhibit are presented in English units and metric units.

The potential disturbance acreages resulting from construction and operations were calculated based on the assumptions in Table 4.1-1 – Disturbance Assumptions. Temporary disturbance is ground disturbance which occurs during the construction phase and will be restored to pre-construction conditions. Permanent disturbance is conversion of undisturbed areas to impervious surfaces (e.g. concrete mattresses, gravel access roads). These disturbance footprints represent the basis for the environmental impact assessment in this Exhibit.

Table 4.1-1 Disturbance Assumptions

Project Component		Area of Temporary Disturbance	Area of Permanent Disturbance
SFEC-NYS	Submarine Cable [a]	4.4 acres (1.8 hectares [ha])	1.3 acres (0.5 ha)
	Submarine Cable Protection [b]	N/A	0.2 acres (0.08 ha)
	Cofferdam[c]	850 cubic yards (650 cubic meters [m])	N/A
SFEC-Onshore [d]		22.0 acres (8.9 ha)	2.4 acres (1.0 ha)
SFEC-Interconnection Facility [e]		2.7 acres (1.1 ha)	1.6 acres (0.6 ha)

[a] Conservatively assumes the SFEC-NYS has a total permanent width of three feet (0.9 m), with an additional temporary width of 10.4 feet (3.2 m) for temporary seabed disturbance during installation.

[b] Conservatively assumes additional cable protection, consisting of rock or concrete matting (eight feet long by 20 feet wide [2.4 m long by 6.1 m wide]), for up to two percent of the SFEC-NYS, where burial depth may not achieve the target of four feet to six

feet (1.2 m to 1.8 m). However, the Applicant anticipates a high probability of achieving target burial depth in New York State territorial waters.

[c] Cofferdam will potentially enclose an area that is 75 feet long by 25 feet wide to a depth of up to 12 feet (22.9 m long by 7.6 m wide to a depth of up to 3.7 m).

[d] The work area associated with the horizontal directional drill (HDD) for the sea-to-shore transition is included within this temporary disturbance calculation.

Conservatively assumes the entire footprint of the SFEC-Onshore corridor will be temporarily disturbed during construction.

Conservatively assumes during operations, a path approximately 10 feet wide (3.0 m) above the cable duct bank along the Long Island Railroad (LIRR) right-of-way (ROW) will need to remain clear for access and maintenance purposes resulting in the only permanent disturbance. Permanent disturbance does not include manhole locations along previously disturbed areas.

[e] Vegetation will be allowed to grow for additional screening within the 2.7 acre (1.1 ha) footprint.

Extensive field surveys, existing data review, and agency consultations were conducted to identify, quantify, and describe existing environmental conditions within the vicinity of the portions of the SFEC subject to Article VII review (SFEC-NYS, SFEC-Onshore, and SFEC-Interconnection Facility).

Field surveys, which were conducted during the summer, fall, and winter of 2017, assessed physical conditions (e.g. geology, surface waters, benthic resources), biological resources (e.g. vegetation, wildlife), and land use (e.g. agriculture, cultural resources, scenic areas).

Desktop evaluations included but were not limited to the Suffolk County Soil Survey, aerial photography, United States Geological Survey (USGS) topographic maps, National Wetlands Inventory (NWI) maps, New York State Freshwater Wetland Maps, State-mapped streams, 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, offsite meetings, and onsite field reviews. These agencies included the New York State Public Service Commission (NYSPSC), the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), the New York State Department of Environmental Conservation (NYSDEC), the New York Natural Heritage Program (NYNHP), the New York State Department of Agriculture and Markets (Ag & Mkts), the New York State Department of Transportation (NYSDOT), the New York State Department of State (NYSDOS), the New York State Office of General Services, the United States Army Corps of Engineers (USACE), the United States Environmental Protection Agency (USEPA), the United States Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA) National

Marine Fisheries Service (NMFS), the United States Coast Guard, and the National Parks Service (NPS). Appendix K – Agency Correspondences includes a summary of agency meetings and copies of key correspondence.

The results of the existing conditions investigations are presented in the sections below by resource type.

- Land uses;
- Visual and aesthetic resources;
- Cultural and historic resources;
- Topography, geology, soils, and groundwater;
- Terrestrial vegetation and wildlife;
- Wetlands and waterbodies;
- Marine physical and chemical characteristics;
- Finfish;
- Benthic and shellfish resources;
- Important habitats and rare, threatened, and endangered (RTE) species;
- Noise;
- Air Quality; and
- Electric and magnetic or electromagnetic fields (EMF).

Potential effects and impacts are characterized as direct or indirect and whether they result from Project construction, or operation and maintenance (O&M). Anticipated effects and impacts are characterized as short-term or long-term and by intensity, as negligible, minor, moderate, or significant. The following impact levels are used to provide consistency in the assessment of potential environmental effects and impacts:

Direct or Indirect: Direct effects are those occurring at the same place and time as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity.

Short-term or Long-term Impacts: Short- or long-term impacts do not refer to any defined period. In general, short-term impacts are those that occur only for a limited period or only during the time required for construction activities. Impacts that are short-lived, such as noise from routine maintenance work during operations, may also be short-term if the activity is short in duration and the impact is restricted to a short, defined period. Long-term impacts are those that are likely to occur on a recurring or permanent basis, or impacts from which a resource does not recover quickly. In general, direct impacts associated with construction are considered short-term because they will occur only during the construction phase. Indirect impacts are determined to be either short-term or long-term depending on if resource recovery may take several years. Impacts associated with O&M are considered long-term because they occur over the life of the Project.

Negligible, Minor, Moderate, or Significant Impacts: Negligible, minor, moderate, or significant impacts are relative terms used to characterize the magnitude of an impact.

- Negligible impacts are generally those impacts that, if perceptible, would not be measurable.
- Minor impacts are those impacts that, if adverse, would be perceptible but, in context, avoidable with proper mitigation; and, if impacts are measurable, the affected system would be expected to recover completely without mitigation once the impact is eliminated.
- Moderate impacts are those that, if adverse, would be measurable but would not threaten the viability of the affected system and would be expected to absorb the change or impact if proper mitigation or remedial action is implemented.
- Significant impacts are those impacts that, if adverse, would be measurable but not within the capacity of the affected system to absorb the change, and without significant mitigation, could be severe and long lasting.

Upon receipt of all required permits, approvals, and other land rights, and following the completion of all required notifications, the site will be prepared for construction. All construction activities will be conducted in accordance with any Project Certificate Conditions and Best Management Practices (BMPs) and the Applicant will comply with all state, federal, and local laws, as addressed in Exhibit 7: Local Ordinances. Mitigation measures proposed for the Project include stormwater control measures, which will be identified in the Project Environmental Management and Construction Plan (EM&CP) and in the Stormwater Pollution

Prevention Plan (SWPPP) (see Appendix N – EM&CP Outline). In addition, mitigation measures specific to the environmental impacts detailed in Subsections 4.2 through 4.14 are discussed within each subsection.

4.2 Land Use

This section evaluates existing land uses and local zoning along the SFEC-NYS and SFEC-Onshore corridors and at the SFEC-Interconnection Facility. In addition, land use regulations and policies for the Town of East Hampton, as well as for New York State, have been reviewed to determine the Project's consistency with present or future planned land uses. An assessment of the applicability of local ordinances and zoning for Suffolk County, New York, and the Town of East Hampton is provided in Exhibit 7: Local Ordinances.

4.2.1 Existing Land Uses

Existing land use along the SFEC-NYS corridor is entirely vacant underwater land, with the exception of the sea-to-shore transition which traverses the beach. Existing land use along the SFEC-Onshore corridor was classified based on review of the following: 2016 Google Earth aerial imagery; 2015 tax parcel geographic information systems (GIS) data from Suffolk County Real Property Tax Service Agency's Advanced Real Estate Information System; and New York State property type classification and ownership codes assigned to tax parcels (New York State Department of Taxation and Finance, 2017). Field surveys were also performed over the course of 28 days (between May 24 and November 8, 2017), during which the SFEC-Onshore corridor, the sea-to-shore transition corridor, the SFEC-Interconnection Facility site, and the existing East Hampton Substation location were driven and walked, where necessary, to confirm land uses documented during aerial photograph and GIS review. The study area for land use includes 500 feet (152 m) onshore on either side of the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility and existing East Hampton Substation were surveyed within the proposed/existing substation boundaries (see Appendix A – Biological Resources Report and Appendix F - Phase 1 Environmental Site Assessments). Figure 4.2-1 – Existing Land Uses and Table 4.2-1 – Land Use show the existing land uses onshore within the study area for the SFEC-Onshore, the sea-to-shore transition corridor, the SFEC-Interconnection Facility, and the existing East Hampton Substation.

The existing land uses along the majority of the SFEC-Onshore corridor and the sea-to-shore transition corridor are predominantly low-medium residential (all single-family residences) and vacant land (undeveloped land not reserved as a community preservation area or a nature preservation area). To a lesser extent, the study area also includes commercial, transportation (e.g. land associated with the East Hampton Airport), industrial, agricultural, institutional/community facilities (including schools, libraries, fire departments, police stations, religious centers, and recreational facilities), recreational uses (parks and recreational clubs) and open space (see Table 4.2-1 below).

The study area surrounding the public road ROWs (i.e. Beach Lane, Wainscott Main Street, Sayre's Path, Wainscott Stone Road, Wainscott Northwest Road and Montauk Highway) consists of predominantly single-family residential uses, with pockets of agricultural uses (on Beach Lane), and scattered vacant land. As the SFEC-Onshore crosses Montauk Highway/State Route 27 and continues on Wainscott Northwest Road, land uses vary. The study area along this segment is comprised of commercial, institutional, open space, and industrial uses.

When the SFEC-Onshore transitions from utilizing existing public road ROWs to the LIRR ROW, the land uses become mixed. Specifically, there are industrial, commercial, institutional/community facilities, recreational, vacant land, open space, single-family residential and utility/transportation uses in this segment of the SFEC-Onshore corridor to the SFEC-Interconnection Facility (a detailed Project location description is within Exhibit 2: Location of Facilities).

Table 4.2-1 Land Use

Land Use	Present Within 500 feet			Approximate Total Percentages
	SFEC-Onshore	***SFEC-Interconnection Facility***	***Sea-to-Shore Transition Corridor***	
Agriculture	X			2.25 percent
Commercial	X			5.75 percent
Institutional/Community Facilities	X			1.50 percent
Light Industrial/Industrial/Warehouse	X	X		2.75 percent
Low/Medium Density Residential	X	X		63.75 percent
Medium Density Residential	X			0.25 percent

Land Use	Present Within 500 feet			Approximate Total Percentages
	SFEC-Onshore	***SFEC-Interconnection Facility***	***Sea-to-Shore Transition Corridor***	
Open space	X	X		5.75 percent
Recreation	X		X	2.00 percent
Utility/Transportation	X	X		3.75 percent
Vacant	X			12.00 percent
Waterbody			X	0.25 percent

4.2.2 Zoning

Zoning maps were obtained for the Town of East Hampton (George Walbridge Surveyors P.C., 2004; Town of East Hampton Department of Information Technology, 2014). These maps depict the zoning districts along the SFEC-Onshore, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility. The Town of East Hampton does not designate a zoning district for the Atlantic Ocean. The Town zoning map indicates that zoning districts end at the shoreline; therefore the SFEC-NYS located offshore is not within a zoning district. Figure 4.2-2 - Zoning Districts and Table 4.2-2 – Zoning Summary below depict the existing Town zoning districts along the SFEC-Onshore, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility and existing East Hampton Substation. The zoning districts surrounding the SFEC-Onshore within the public road ROWs and the sea-to-shore transition corridor are predominantly residential zoning districts, while zoning districts surrounding the SFEC-Onshore within the LIRR ROW and at the SFEC-Interconnection Facility vary. An assessment of the applicability of local ordinances and zoning for Suffolk County, New York and the Town of East Hampton is provided in Exhibit 7: Local Ordinances.

Table 4.2-2 Zoning Summary

Municipality	Zoning District	Principal Permitted Uses	Special Permit Uses
Town of East Hampton	Residence A (A) District Residence A2 (A2) District Residence A3 (A3) District Residence A5 (A5) District Residence B (B) District	Single-family residences; parks; nature preserve or sanctuary; and agriculture	Animal husbandry; mariculture, research and development (excluding B District); riding academy; taxi company; and winery (permitted in A, A2 and A3 Districts only)

Municipality	Zoning District	Principal Permitted Uses	Special Permit Uses
Town of East Hampton	Central Business (CB) District	Agricultural uses (including florist shop and garden center); antique shop or antique auction gallery; artists and craftsmen workshops; auditorium or meeting hall; bank; boat rentals or fishing station; carpentry, plumbing or heating supply shop; funeral home, mortuary or chapel; car dealership; professional offices; personal service shop (e.g. barbershop, beauty parlor); printing shop; recording/production facility; minor recreational facility; repair shops; restaurants (including take-out food store, bar or tavern); retail stores; riding academy; exercise studio; taxi company; and technical and trade school	Accessory restaurant or bar to resort or transient motel; animal husbandry; bus terminal; car wash; custom workshop; fast-food restaurant or drive-in; filling station; fish market; formula store; garage (both storage and repair); motion picture theater; multiple business complex; nightclub; office park; rail terminal; supermarket; superstore; theater company; truck terminal; veterinarian or veterinary hospital (no outdoor kennels); wholesale business; wholesale/retail beverage distribution, wholesale bakery; winery; dry cleaning or laundry; laboratory; and service commercial
Town of East Hampton	Commercial-Industrial (CI) District	Agriculture, artist workshop, boatyard, carpentry, custom workshop, filling station, garage (repair and storage), car dealership, printing shop, recording/production facility, repair shops, riding academy, exercise studio, taxi company, wholesale business (lumber and building products), wholesale/retail beverage distribution, wholesale bakery, publishing, truck terminal or truck transfer station, warehouse (storage yards or building supplies distribution)[1]	Air terminal; animal husbandry; auditorium or meeting hall; bus terminal; car wash; fish market; mariculture, research and development; motion picture theater; office park; rail terminal; major recreation facility; technical and trade school; theater company; truck terminal; veterinarian or veterinary hospital; winery; dry cleaning or laundry; exterminator; fish processing facility; fuel storage in tanks; laboratory; multiple industrial complex; paving and construction material manufacture; planned industrial park; recycling and scrap yard; sand mining and excavation; service commercial (requires reduced minimum lot area); and unlisted nonnuisance industry[a]
Town of East Hampton	Park and Conservation (PC)	Camping ground	Mariculture, research and development; and recreational marina

[a]As a substation is not specifically listed in the Town of East Hampton's *Use Table for Commercial Uses*, the existing East Hampton Substation can be considered an "Unlisted Nonnuisance Industry" as defined by §255-1-20 of the Town of East Hampton Town code as "*any industrial use which is not specifically listed on a Use Table in Article XI as prohibited in the Commercial Industrial District, and which, if established, will at all times be able to comply with all requirements of Chapters 180 (Natural Resources) and 185 (Noise) of this Code, as well as all requirements of federal, state and local law which are applicable to it.*" An Unlisted Nonnuisance Industry is permitted in the CI District as a special permit use.

As illustrated in Figure 4.2-2, zoning districts surrounding the SFEC-Onshore and the sea-to-shore transition corridor are primarily within Town of East Hampton residential zoning districts before the SFEC-Onshore terminates at the SFEC-Interconnection Facility in the Town of East Hampton CI zoning district. However, aside from the portion of the sea-to-shore transition corridor that crosses the Beach Lane public beach within an A2 district and at the SFEC-Interconnection Facility, the Project will be entirely within State, Town of East Hampton, and LIRR ROWs where zoning districts are not applicable. Thus, the discussion of zoning districts along the Project corridor refers to all zoning districts within the study area, not specifically along the SFEC-Onshore corridor, the sea-to-shore transition corridor, or at the SFEC-Interconnection Facility.

Existing zoning districts surrounding the public road ROWs (i.e. Beach Lane, Wainscott Main Street, Sayre's Path, Wainscott Stone Road, Wainscott Northwest Road and Montauk Highway/State Route 27) include A, A2, A5, B, CB and CI districts. Existing zoning districts surrounding the LIRR ROW, includes A, A2, A3, A5, B, CI, and PC districts.

4.2.3 Land Use Policies

Several State and local land use policies guide land use in the area of East Hampton where the Project will be located. A description of the relevant land use plans as identified by the Applicant is included in Table 4.2-3 – Land Use Plans below. Further information on the consistency and conformance with relevant land use plans is included in Section 4.2.4, *Potential Land Use Impacts and Proposed Mitigation*.

Table 4.2-3 Land Use Plans

Land Use Plans	Land Use Plan Description
State Land Use Plans	
2016 New York State Open Space Conservation Plan	The intent of the 2016 New York State Open Space Conservation Plan (NYSDEC and NYSOPRHP, 2016) (Open Space Plan) is 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 New York State. This plan offers numerous comprehensive recommendations, and statewide strategies to encourage state and local governments, as well as nonprofit organizations, to achieve these conservation goals. The Open Space Plan divides New York State into nine regional priority conservation projects; Long Island is identified as Region 1. Of the 140 regional priority conservation projects across the state, the following are in the vicinity of the Project, or may apply to the proposed Project (See the priority projects map within the Open Space Plan for project location details): • Project 4: Peconic Pinelands Maritime Reserve. - East Hampton Pine Barrens: *Parcels in the South Fork SGPA near Wainscott and Sag Harbor, atop*

Land Use Plans	Land Use Plan Description
	the most voluminous portion of East Hampton's potable groundwater supply (NYSDEC and NYSOPRHP, 2016, 83). • Project 138: statewide farmland protection – *Farmland protection is a critical component of the State's overall efforts to conserve open space. This land provides fresh produce, scenic open space, vital wildlife habitat, and the economic backbone to many communities* (NYSDEC and NYSOPRHP, 2016, 157). • Project 140: statewide small projects - Rare Habitats: *Protects habitats for rare plants or animal species or rare natural communities.* - Waterway Access: *Provide access to state waters for boating activities, including canoeing and kayaking…* - Historic and Archeological Resources: *Protect historic and archeological resources that are eligible for listing or are listed on the State or National Register of Historic Places (NRHP)*. - Important Bird Areas (IBA): *Provide protection through acquisition or easement for areas designated by the Audubon Society as Important Bird Areas* (NYSDEC and NYSOPRHP, 2016, 162–163).
2015 New York State Energy Plan	The *2015 New York State Energy Plan* (New York State Energy Planning Board, 2015) promotes a clean, resilient, and affordable energy system for New York State. It also coordinates Governor Andrew M. Cuomo's 2014 Reforming the Energy Vision initiative and seeks to encourage the private sector market to provide clean energy solutions to communities and individuals in New York State, create jobs, and drive local economic growth (Cuomo, 2017). The *2015 New York State Energy Plan* describes a number of initiatives designed to help New York State meet its energy goals. These initiatives are categorized as follows: • Renewable energy • Buildings and energy efficiency • Clean energy financing • Sustainable and resilient communities • Energy infrastructure modernization • Innovation and research and development • Transportation New York State is seeking to support development of increased renewable energy options, including through its Offshore Wind Initiative.
New York State Coastal Zone Management Program	To provide for management of the nation's coastal resources, Congress passed the Coastal Zone Management Act in 1972, from which the NYSDOS derives its Coastal Management Program (CMP) (NYSDOS, 1982). New York State's CMP contains 44 statewide policies that each "either promotes the beneficial use of coastal resources, prevents their impairment, or deals with major activities that substantially affect numerous resources" (NYSDOS, 1982, II-6-1). New York State's Waterfront Revitalization of Coastal Areas and Inland Waterways Act, passed in 1981, enables local communities to adopt their own Local Waterfront Revitalization Programs (LWRP), with policies adapted to meet local needs. The *Town of East Hampton LWRP* (Town of East Hampton, 1999), which provides a refinement of the state coastal policies to reflect considerations specific to East Hampton, is discussed in Section 4.2.3.4, *Town of East Hampton Local Waterfront Revitalization Program* below and in Appendix L - Consistency with New York State Coastal Management Program Policies and Town of East Hampton Local Waterfront Revitalization Program Policies.
Local Land Use Plans	

Land Use Plans	Land Use Plan Description
Suffolk County Comprehensive Master Plan 2035	The *Suffolk County Comprehensive Master Plan 2035: Framework for the Future* (AKRF, Inc., 2015) (Suffolk County 2035 Plan) 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, New York. 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. This 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 encourages renewable energy, greening of public infrastructure, and cooperation with local energy utilities in order to protect the environment and enhance human capital.
East Hampton Scenic Areas of Statewide Significance	*East Hampton Scenic Areas of Statewide Significance* (Dodson Associates, 2010) (East Hampton SASS) was developed through a collaborative effort between the Town, with support from the NYSDOS, Division of Coastal Resources, and public participation. The Scenic Areas of Statewide Significance (SASS) program protects scenic landscapes and provides strategies for future preservation by reviewing projects that require state or federal actions including direct actions, permits, or funding. This East Hampton SASS study identifies nine SASS, totaling approximately 25,050 acres (10,137 ha) including: Montauk Point, Lake Montauk, Hither Hills, Napeague, Accabonac, Gardiners Island, Three Mile Harbor, Northwest, and East Hampton. In addition, the East Hampton SASS identifies areas with potential for designation as Scenic Areas of Local Significance (SAL), which will be protected through local and county measures or through additional state programs. The SASS and SAL, which the Project and study area will traverse include the East Hampton SASS (including the Georgica/Wainscott SASS Subunit) and the Wainscott SAL
Town of East Hampton Comprehensive Plan	The *Town of East Hampton Comprehensive Plan* (Liquori and Nagle, 2005) was adopted in May 2005 in response to changing conditions within the Town. According to the *Town of East Hampton Comprehensive Plan*, East Hampton contains natural and cultural resources that are significant to the region, state, nation, and internationally. This comprehensive plan and accompanying zoning maps were prepared to protect East Hampton, as well as to prevent deterioration in the natural environment and living conditions. Recommendations in the plan are intended to reduce impacts to groundwater resources in the Town, natural resources, scenic resources, historic resources, and existing character. The *Town of East Hampton Comprehensive Plan* also contains additional plans, one for each of the five hamlets within the Town. The relevant planning areas for the Project and study area include Wainscott and East Hampton.
Community Preservation Project Plan for the Town of East Hampton	The *Town of East Hampton Community Preservation Project Plan* (Town of East Hampton Planning Department and the Land Acquisition and Management Department, 2011) (CPPP) was adopted in 2011 as an update to the previous CPPP adopted in 1998. The 2011 CPPP includes a specific listing of every parcel of land that the Town and the incorporated villages within the Town boundaries intend to acquire. In addition to acquisition, the 2011 CPPP identifies alternatives for preservation of identified parcels, which include zoning regulations, cluster or open space subdivisions, reduced density subdivisions, private conservation, transfer of development rights, and scenic, conservation, wetland, corridor, and façade easements. The *Wainscott School District* map (Town of East Hampton, 2011) depicts existing designated open space parcels and recommended properties to be acquired by Community Preservation Fund (CPF). There are several identified open space parcels and recommended CPF parcels proximate to the Project and within the study area.

4.2.3.1 Floodplains

FEMA designated floodplains or Special Flood Hazard Areas (SFHA) are located along and in the vicinity of the Project. SFHAs are areas covered "by the floodwaters of the base flood" (FEMA, 2017). As described in Table 4.2-4 – Location of FEMA Floodplains in the Project Vicinity and depicted in Figure 4.2-3 - Floodplains, a review of the FEMA FIRM for the Town of East Hampton indicated that a portion of SFEC-Onshore and the sea-to-shore transition corridor is within the 100-year floodplain (1,680 feet [512 m]). A very limited portion of the Project is within the 500-year floodplain in select areas along the SFEC-Onshore corridor. The remainder of Project is not within a designated floodplain.

Table 4.2-4 Location of FEMA Floodplains in the Project Vicinity

FEMA Zone	Location	Length of Crossing (feet)
VE (1-percent annual chance)	Coast to the Beach Lane parking area	545± (166 m)
AE (1-percent annual chance)	Beach Lane parking area to a point along Beach Lane	1,135± (346 m)
X (0.2-percent annual chance)	A point along Beach Lane to a point north along Beach Lane	110± (34 m)
X (0.2-percent annual chance)	A point along Wainscott Stone Road south of Wainscott Northwest Road to a point north of Wainscott Northwest Road	540± (165 m)

4.2.3.2 Agricultural Districts

Article 25-AA of the Ag & Mkts Law, the Agricultural Districts Law of 1994, permits the establishment of local agricultural districts through land owner initiative, preliminary county review, county adoption, and state 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. Figure 4.2-4 - Agricultural Districts depicts the agricultural districts proximate to the Project.

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, six parcels within Agricultural District No. 5 exist within the Project study area. These parcels are concentrated at the beginning of the SFEC-Onshore along Beach Lane and Wainscott Main Street.

4.2.3.3 Parks and Recreational Resources

The sea-to-shore transition corridor is located within a Town of East Hampton recreational resource. There are two parks and two recreational resources in the vicinity of the Project, as described in Table 4.2-5 – Parks and Recreational Resources in the Vicinity of the Project, below.

Table 4.2-5 Parks and Recreational Resources in the Vicinity of the Project

Recreational Area or Park Name	Location	Park Description	Location Relative to Project
Beach Lane Town beach	Beach Lane	Ocean access on Beach Lane	Within the Sea-to-Shore Transition Corridor
Stephen Hands Path Ball Field	110 Stephen Hands Path, East Hampton	Athletic fields, playground, parking lots, volleyball, walking track	South of SFEC-Onshore (100 feet [30 m])
Hampton Racquet	172 Buckskill Road	Tennis courts	South of SFEC-Onshore (50 feet [15 m])
Buckskill Tennis Club	178 Buckskill Road	Tennis courts	North of SFEC-Onshore (50 feet [15 m])

4.2.3.4 Town of East Hampton Local Waterfront Revitalization Program

The *Town of East Hampton LWRP* (Town of East Hampton, 1999), which was adopted by the Town of East Hampton Town Board on December 3, 1999 and was approved by the New York State Secretary of State on December 20, 2007, adapted the 44 CMP statewide coastal policies to meet the goals of the local community. Federal, State, and local actions that occur within the state's coastal area must demonstrate consistency with the coastal policies, as adapted in the LWRP to address local issues. See Appendix L for a discussion of the consistency of the Project with each of the 44 policies in the LWRP.

4.2.4 Potential Land Use Impacts and Proposed Mitigation

Construction of the Project will result in short-term, minor, and localized impacts to land use (i.e. zoning, floodplains, agricultural districts, and parks and recreational resources). The SFEC-Onshore and the sea-to-shore transition will be constructed entirely underground within existing State and Town road ROWs and along the LIRR ROW. Any areas temporarily disturbed during installation of the SFEC-Onshore and the sea-to-shore transition corridor will be restored in-kind. The Applicant will perform construction activities in accordance with local zoning requirements or other regulatory approvals as discussed in Exhibit 7: Local Ordinances. Therefore, the Project will not conflict with current land uses or future planned land uses within, adjacent, or proximate to the Project study area.

Operation of the Project will be consistent with established land uses and State and local land use policies, due to the SFEC-Onshore being installed entirely underground. The new SFEC-Interconnection Facility will be located on a vacant portion of the approximately 18 acre (7 ha) existing East Hampton Substation parcel at Cove Hollow Road. The SFEC-Interconnection Facility installation will be consistent with the existing land use at the existing East Hampton Substation and is not anticipated to impact land uses in the area since the interconnection facility will be within the existing property. In addition, land uses in the study area, north of the existing East Hampton Substation, consist of light industrial uses and the SFEC-Interconnection Facility will be consistent with these uses.

Potential construction and operational impacts, mitigation measures, and/or consistency with zoning, State and local land use plans, floodplains, agricultural districts, and parks and recreational resources are described below.

Zoning

The Applicant will undertake all construction activities in accordance with the Town of East Hampton local zoning requirements and other regulatory approvals, as described further in Exhibit 7: Local Ordinances. The Project will be consistent with zoning in the study area.

State and Local Land Use Plans

The Project will be consistent with relevant State and local land use plans:

2016 New York State Open Space Conservation Plan

The Project will be consistent with the 2*016 New York State Open Space Conservation Plan* as the SFEC-NYS and SFEC-Onshore will not impact access to New York State territorial waters. The SFEC-Onshore will be located underground within public road ROWs and the LIRR ROW, thereby not affecting preserved open space as identified in this plan. Groundwater and surface waters will not be negatively impacted as a result of the SFEC-Onshore, as demonstrated in Section 4.5, *Topography, Geology, Soils, and Groundwater* and Section 4.7, *Wetlands and Waterbodies*. Further, the SFWF, the SFEC-OCS, and the Project will provide a clean, renewable source of energy as an alternative to the burning of fossil fuels that produce greenhouse gas (GHG) emissions, which will assist in combatting climate change. The SFEC-Onshore will not impact land that is identified as proposed to be acquired, in this plan.

2015 New York State Energy Plan

The Project will be consistent with the goals set forth in the *2015 New York State Energy Plan*, as the SFWF, the SFEC-OCS, and the Project are designed on the premise that renewable energy can be a reliable and cost-effective solution to modern electricity challenges. As a clean energy technology, the SFWF and the Project will be a step toward the state's goal to advance the use of renewable energy technologies in New York State. Further, by adding a potential of a maximum 90 megawatts (MW) of electricity (at delivery at the existing East Hampton Substation) from a non-carbon emitting generating source, the Project will help to reduce the intensity of carbon emissions in the State's energy sector, in keeping with the stated goals in the *2015 New York State Energy Plan.* The SFWF and Project will also be a step toward new private capital investment and innovation in clean energy technologies. Moreover, the Project will help LIPA meet its goal, per the State's clean energy standard, of providing 800 MW of renewable generation by 2030 (PSEG Long Island, 2017). Furthermore, the SFWF and Project will advance the Offshore Wind Initiative discussed in the *2015 New York State Energy Plan*, and the resulting electricity generation will help the Town of East Hampton accomplish its goal of moving to 100 percent renewable energy by 2030 (Certic, 2014). Thus, the Project will reduce the demand for electricity generated by the burning of fossil fuels (e.g. oil, natural gas) at traditional power plants that produce GHG emissions, and build new sustainable energy infrastructure that will enhance Long Island's ability to provide clean and reliable energy, in keeping with the goals of this plan.

Suffolk County Comprehensive Master Plan 2035

The Suffolk County 2035 Plan encourages renewable energy, greening of public infrastructure, and cooperation with local energy utilities in order to protect the environment and enhance human capital. Since the SFWF, the SFEC-OCS, and the Project will provide clean, renewable energy to Long Island's South Fork, it will be consistent with the objectives in the Suffolk County 2035 Plan. One of the themes in the Suffolk County 2035 Plan focuses on reclaiming the quality of groundwater, surface water, and terrestrial resources. HDD will be employed as needed to protect such resources, as further discussed in Section 4.7, *Wetlands and Waterbodies* and Section 4.5, *Topography, Geology, Soils, and Groundwater*.

East Hampton Scenic Areas of Statewide Significance

Development of the sea-to-shore transition corridor will be entirely underground. Access to the transition vault will be through pre-installed HDD conduit that will provide isolation and cable protection between the onshore transition vault and the HDD exit point. Therefore, the sea-to-shore transition will be consistent with the East Hampton SASS. The SFEC-Onshore will be constructed entirely underground within State, Town of East Hampton, and LIRR ROWs, and will not be visible or encroach onto any land outside of the existing ROWs, and therefore will be consistent with the East Hampton SASS, including the Georgia/Wainscott SASS subunit, as well as the Wainscott SAL, as further discussed in Section 4.3, *Visual and Aesthetic Resources*. Further, the SFEC-Interconnection Facility will be visually similar to the existing East Hampton Substation off of Cove Hollow Road.

Town of East Hampton Comprehensive Plan

Since the SFEC-Onshore and the SFEC-Interconnection Facility will be located entirely within public road ROWs, the LIRR ROW, and the existing East Hampton Substation property, it is anticipated that there will be no negative impact to the Town of East Hampton's environmental and cultural resources, as discussed in the *Town of East Hampton Comprehensive Plan*. Additionally, HDD will be utilized for the sea-to-shore transition corridor, where necessary, to minimize disturbance and impacts to environmental and cultural resources. Potential impacts to such resources are evaluated in detail in Section 4.5, *Topography, Geology, Soils, and Groundwater*, Section 4.6, *Terrestrial Vegetation and Wildlife*, and Section 4.7, *Wetlands and Waterbodies*. Furthermore, construction of the SFEC-Onshore, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility will not negatively impact cultural and archaeological resources, as demonstrated in Section 4.4, *Cultural and Historical Resources*. No infrastructure will be negatively impacted as a result of the SFEC-Onshore, the sea-to-shore transition corridor, or the SFEC-Interconnection Facility. The SFWF will be consistent with the *Town of East Hampton Comprehensive Plan,* specifically Recommendation 76, as the Project will provide the South Fork with clean, renewable energy through a cost-effective energy source.

Additionally, as the SFEC-Onshore will be located entirely within public road ROWs and the LIRR ROW, existing Pine Barrens and agriculture within the study area will not be negatively impacted, as HDD will be utilized in accordance with the Plan for Wainscott. Although construction of the SFEC-Onshore will occur along Montauk Highway/State Route 27, the Project will not encourage new development along this roadway. There may be temporary construction impacts associated with the construction of the SFEC-Onshore, however, these impacts will be minimized as the Applicant will work with local agencies and provide planned construction schedules, thereby not affecting existing land uses along Montauk Highway/State Route 27.

Similarly, Oak/Hickory Forest and Meadow/Old Field Site Type will not be negatively impacted, as clearing, grubbing and/or trimming of these plant species will be limited where possible. Vegetation impacts will be limited to the minimum necessary to accommodate open trenching and other work activities. Clearing of Coastal Oak-Hickory Forest and Successional Shrubland communities will occur to construct the SFEC-Interconnection Facility. Vegetation impacts will be limited to the minimum necessary to accommodate SFEC-Interconnection Facility construction activities. Revegetation and restoration of disturbed areas within the SFEC-Onshore corridor will include preparation of the soil for subsequent plantings, application of topsoil (as required) and the seeding of grass and/or planting of shrubs and trees, as necessary. Where permanent restoration is not immediately possible (e.g. due to winter weather conditions), the disturbed areas will be temporarily restored until permanent restoration can occur. Temporary restoration measures will include hydroseeding or mulching of exposed earth to stabilize soils, as necessary, in accordance with the *Plan for East Hampton.*

Community Preservation Project Plan for the Town of East Hampton

With the exception of the SFEC-Interconnection Facility, the onshore components of the Project will be installed within public road ROWs and the LIRR ROW and will be installed underground. Therefore, the Project will have no impacts on parcels identified for potential acquisition for preservation or on existing open space parcels listed in the 2011 CPPP.

Floodplains

While construction activities will temporarily disturb ground surfaces within floodplains along portions of the Project, the cable will ultimately be an underground facility, with limited or no new associated impervious surfaces, and will not increase the base flood elevation in any floodplain. Furthermore, the SFEC-Interconnection Facility is not located within a floodplain, and, therefore, will not impact base flood elevations.

Agricultural Districts

The Project is not anticipated to impact agricultural land uses in the Agricultural Districts, as the SFEC-Onshore will be installed underground within existing public road ROWs and along the LIRR ROW. At the sea-to-shore transition location, the SFEC-Onshore will be installed beneath Beach Lane, which is not an agricultural use or within an Agricultural District. Installation work within the Town road ROW is not anticipated to disrupt agricultural operations at the Agricultural District properties abutting Beach Lane and Wainscott Main Street. During construction, the Applicant will minimize potential impacts on adjacent agricultural land by limiting vegetation clearing and ground disturbance to the construction corridor. The SFEC-Onshore will continue to the SFEC-Interconnection Facility which is also not an agricultural use or within an Agricultural District.

Parks and Recreational Resources

The Project is not anticipated to impact parks and recreational resources, as the SFEC-Onshore will be underground, entirely below grade within public road ROWs and the LIRR ROW, and the SFEC-Interconnection Facility will be installed adjacent to the existing East Hampton Substation. The sea-to-shore transition will also be installed underground, and low impact installation (HDD) will be utilized to limit potential impacts to Beach Lane for the installation of the sea-to-shore transition corridor. Construction along Beach Lane at the sea-to-shore transition location will temporarily interrupt public access to the coast from Beach Lane. However, there will be no permanent negative impact to public water-related recreation resources at Beach Lane. Furthermore, land cover along the SFEC-Onshore and along the sea-to-shore transition corridor will be replaced in-kind. It is anticipated that the duration of disturbance will be limited to the construction period and there will be no permanent impact upon parks and recreational resources.

4.3 Visual and Aesthetic Resources

This section evaluates visual and aesthetic resources within the vicinity of the Project. A Visual Resource Assessment (VRA) was prepared by the Applicant for the Project, which is included as Appendix B – Visual Resource Assessment and is summarized below (EDR, 2018a). The SFEC-Interconnection Facility is the only above-ground facility that will be built as part of the Project, and therefore, the VRA only considers the SFEC-Interconnection Facility. The SFEC-Onshore and the SFEC-NYS (including the sea-to-shore transition) will be installed either underground or beneath the seabed, and will not result in any potential visual impacts.

Per 16 NYCRR § 86.3(a)(1)(iii), which requires mapping of "any known archaeologic, geologic, historical or scenic area, park or untouched wilderness on or within three miles of the right-of-way," the visual study area was defined as a three mile (five km) radius around the SFEC-Interconnection Facility. The three-mile visual study area covers approximately 28.3 square miles (73.3 square km) and lies within the Towns of East Hampton and Southhampton, encompassing the Village of East Hampton in its entirety as well as a portion of the Village of Sagaponack. The visual study area also overlaps approximately 5.3 square miles (13.7 square km) of the Atlantic Ocean. The location and extent of the visual study area is illustrated in Figure 4.3-1 – Visually Sensitive Resources, Figure 4.3-2 – Viewshed Analysis, and Figure 4.3-3 – Viewpoint Location Map.

4.3.1 Existing Visual Character

This section describes the existing visual character, comprised of physiographic/land use settings, landscape character, and viewer/user groups within the study area.

4.3.1.1 Physiographic/Land Use Setting

The visual study area lies within the Embayed section of the Coastal Plain physiographic province, which in turn falls within the Atlantic Plain physiographic division (Fenneman and Johnson, 1946). The dominant land form within the visual study area is the uneven ridgeline passing through the northern portion of the study area. The area to the south of this landform gently slopes toward Georgica Pond, Hook Pond, the valley along Threemile Harbor Road, and the Atlantic Ocean. Elevation within the visual study area ranges from sea level in the south to approximately 182 feet (55 m) above mean sea level (amsl) in the northwestern portion of the study area, south of Whooping Hollow Road. Land use within the study area consists of a mix of suburban residential and commercial development, agricultural fields, nurseries, and forested areas. The LIRR passes through the center of the visual study area and the East Hampton Airport is located in the western portion of the study area.

4.3.1.2 Landscape Character

Review of the landscape character within a given study area provides a useful framework for the analysis of a facility's potential visual effects. Areas of unique landscape character can be defined within the study area based on the similarity of various landscape features, including landform, vegetation, water, and/or land use patterns, in accordance with established visual assessment methodologies (Smardon et al., 1988; USDA Forest Service, 1995; USDOT FHWA, 1981; DOI Bureau of Land Management, 1980). Areas of unique landscape character identified within the visual study area include areas of historic village character; partially forested, up-scale residential development areas; agricultural areas; utilitarian/infrastructure areas; and open water character areas. The general landscape character, use, and potential views to the Project are described in detail in Appendix B.

4.3.1.3 Viewer/User Groups

Three categories of viewer/user groups were identified within the visual study area. These include local residents, through travelers/commuters, and tourists/recreational users. Local residents include those who live and work within the visual study area, typically viewing the landscape from their yards, homes, local roads, and places of employment. Commuters and travelers passing through the area, view the landscape from motor vehicles on their way to work or other destinations. Recreational users and tourists include local (full-time and part-time) residents and out-of-town visitors involved in cultural and recreational activities in locations such as local beaches, parks, schools, athletic facilities, and historic districts within the study area. See Appendix B for a discussion of typical vantage points, user activities, and sensitivity to visual change for each of these user groups.

4.3.2 Visually Sensitive Resource Inventory

This section describes the visually sensitive resource inventory, comprised of visually sensitive resources of statewide significance and visually sensitive resources of local significance within the study area.

4.3.2.1 Visually Sensitive Resources of Statewide Significance

The NYSDEC Program Policy Division of Environmental Permits (DEP)-00-2 *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000) identifies categories of resources that are considered aesthetic resources of statewide significance. To identify visually sensitive resources within the visual study area, consultation of a variety of data sources was completed, including: digital geospatial data (shapefiles) obtained primarily through the New York State GIS Clearinghouse or the Environmental Systems Research Institute; numerous national, state, county, and local agency/program websites, as well as websites specific to identified resources; the DeLorme Atlas and Gazetteer for New York State; USGS 7.5-minute topographical maps; and web mapping services such as Google Maps. The three-mile visual study area radius includes several scenic resources of statewide significance. These include 15 resources listed on the NRHP, 59 resources eligible or potentially eligible for listing on the NRHP, the East Hampton SASS, and two state bike paths. Categories of aesthetic resources of statewide significance that do not occur within the visual study area include: state parks; heritage areas; state forest preserves; national wildlife refuges, state game refuges, and state wildlife areas; national natural landmarks; national parks, recreation areas, seashores, and/or forests; national or state designated wild, scenic, and recreational rivers; sites, areas, lakes, reservoirs, or highways designated or eligible as scenic; the Adirondack Park, the Palisades Park, and state nature and historic preserve areas; and Bond Act properties that were purchased under the exceptional scenic beauty or open space categories. All inventoried visually sensitive resources are listed in Appendix A of the VRA (see Appendix B of this Application), along with distance to the SFEC-Interconnection Facility and potential visibility. The location of these resources is illustrated in Figure 4.3-1.

The National Register of Historic Places (NRHP)

The visual study area includes seven individual properties and eight historic districts listed on the NRHP. The majority of these resources are located within the Village of East Hampton and all are within 1.5 miles (2.4 km) of the Atlantic coast. Individually listed historic properties include the East Hampton Railroad Station, three residences, and three historic windmills.

The area within one mile (2 km)[1] of the SFEC-Interconnection Facility also includes two NRHP-eligible residences, the Josiah Dayton House and Miller Dayton House, both of which have been formally determined to be NRHP-eligible. In addition, the historic resources survey conducted for the Project identified three additional historic properties and one proposed historic district that have been recommended as potentially eligible for listing on the NRHP (EDR, 2018b)(see Appendix B).

Scenic Areas of Statewide Significance (SASS)

The East Hampton SASS occurs along the Atlantic coast through the visual study area, extending anywhere from 0.3 miles to 1.5 miles (0.5 km to 2.4 km) inland from the shoreline, depending on the location (Figure 4.3-1). "The East Hampton SASS is one of the most recognized segments of the New York State coastline. It contains a coastline of exceptional beauty and variety, including historic village and estate neighborhoods, numerous scenic ponds, natural dunefields and productive farmland" (NYSDOS, 2010).

This SASS is divided into three subunits, each of which overlap the visual study area. The Georgica/Wainscott Subunit includes Wainscott, Georgica, and Lily Ponds, farmland, forests, estates, and sandy beaches. Views that contribute to the significance of this subunit include beaches, dunes, expansive ocean views, and scenic ponds. The East Hampton Village Center Subunit consists of seaward portions of the historic East Hampton village center, the mansion district at Apaquogue, the Divinity Hill neighborhood, and historic residential areas on the east side of Main Street. Dominant visual features of this subunit include historic architecture, tree-lined village streets, parks, estate grounds, focal landmarks, and a notable lack of overhead utilities allowing street trees to grow unrestrained. The Further Lane Subunit includes Hook Pond and areas to the east, including the open landscapes of Maidstone Golf Club, the Atlantic Double Dunes Preserve, and farm fields (NYSDOS, 2010).

The location of the SFEC-Interconnection Facility is approximately one mile (2 km) outside of the East Hampton SASS at the nearest point. Furthermore, the views and landscapes contributing to the significance of this resource are focused on the open ocean, sandy shoreline, historic

[1] The Applicant met with staff at the State Historic Preservation Office (SHPO) on March 23, 2017 to discuss potential impacts to cultural resources and the appropriate scope of studies to evaluate those impacts. Based on the predicted minimal visibility of the SFEC-Interconnection Facility (see Section 4.3.4, *Potential Visual and Aesthetic Resource Impacts and Proposed Mitigation*), the SHPO concurred that identification of potential NRHP-eligible resources within a one mile (2 km) study area around the SFEC-Interconnection Facility would be appropriate.

village, and coastal landscapes rather than views inland toward the SFEC-Interconnection Facility. The siting of the Project complies with the New York State CMP's Coastal Policy 24 to prevent impairment of scenic resources of statewide significance, which advises: "Siting structures and other development such as highways, power lines and signs back from the shoreline or in other inconspicuous locations to maintain the attractive quality of the shoreline and to retain views to and from the shore..." (NOAA and NYSDOS, 2017).

The East Hampton SASS document also identifies five areas with potential for designation as SAL, three of which occur within the visual study area and are addressed below in Section 4.3.2.2, *Visually Sensitive Resources of Local Significance*.

State and Federally Designated Trails

State Bike Route 27 is a signed on-road bicycle route along Montauk Highway/State Route 27 through the visual study area. State Bike Route 114 exists as a designated bike lane along State Route 114 and joins with State Bike Route 27 in the Village of East Hampton (NYSDOT, 2017).

4.3.2.2 Visually Sensitive Resources of Local Significance

In addition to the scenic resources of statewide significance identified within the visual study area, the area within one mile (2 km) of the SFEC-Interconnection Facility was reviewed for resources that could be considered regionally or locally significant/sensitive due to the type or intensity of land use they receive. These include the East Hampton High School, the John M. Marshall Elementary School, and the Child Development Center of the Hamptons; Stephen Hands Path Park/Ball Field; several recreational centers and tennis clubs; State Routes 27 and 114 and County Route 59; and areas of intensive land use including the Village of East Hampton and the Hamlets of East Hampton North, Wainscott, and Northwest Harbor.

Additionally, several resources of local significance have been identified within the full extent of the three-mile (5 km) visual study area due to their specific designation as scenic resources (at the local level). These include the previously mentioned potential SAL identified in the East Hampton SASS document as well as locations/views identified as scenic in the Town of East Hampton LWRP (NYSDOS, 2010; Town of East Hampton Planning Department, 2007). The locally significant resources include the East Hampton Village SAL, which is largely made up of the portion of the Village of East Hampton that falls outside of the SASS (with the exception of the Newtown Lane vicinity); the Hardscrabble SAL, which lies to the north of the Village, and is comprised of the East Hampton High School and the adjacent agricultural land that extends to the north and west; and the Wainscott SAL, which encompasses the agricultural area north of Wainscott Pond, between Wainscott Main Street and Montauk Highway/State Route 27. Resources identified as scenic by the Town of East Hampton LWRP are largely located within the East Hampton SASS, including Wainscott Pond and the surrounding roads of Beach Lane, Wainscott Main Street, and Town Line Road; State Route 27 State Access to Georgica Pond; and Further Lane. Outside of the SASS, the East Hampton LWRP identifies Three Mile Harbor, East Hampton Marina, and Three Mile Harbor Marina as scenic resources, all located in the northeastern portion of the study area. As described above, the SFEC-Interconnection Facility has been sited well inland in an area with existing utility infrastructure and, as further described below, no adverse impacts to these SALs are anticipated.

4.3.3 Visibility Analysis Methodology

An analysis of Project visibility was undertaken to identify those locations within the visual study area where there is potential for the SFEC-Interconnection Facility to be seen from ground-level vantage points. The SFEC-Interconnection Facility will include lightning masts, which are anticipated to be the tallest structures within the SFEC-Interconnection Facility. For the purposes of the VRA, the maximum height of the lightning masts was assumed to be approximately 65.5 feet (20.0 m). It is anticipated that the lightning masts in the final design of the SFEC-Interconnection Facility will be considerably shorter at approximately 43 feet (13 m) tall. To provide a conservative analysis, the assessment of potential Project visibility herein was based on the maximum potential height (i.e. 65.5 feet [20.0 m]) of the lightning masts installed at eleven locations within the SFEC-Interconnection Facility footprint. The visibility analysis included identifying potentially visible areas on viewshed maps, verifying visibility in the field, and preparing realistic photographic simulations of the SFEC-Interconnection Facility from four selected viewpoints. To further illustrate the factors that affect visibility from the four selected viewpoints, line of sight profile drawings were prepared to depict the vegetation and other features along a direct line of sight between the viewer and the SFEC-Interconnection Facility. The methodology employed for each of these assessment techniques is described in the VRA, located in Appendix B.

4.3.4 Potential Visual and Aesthetic Resource Impacts and Proposed Mitigation

The Project has been designed to minimize impacts to visual and aesthetic resources. Potential visibility and visual effects resulting from the construction and operation of the SFEC-Interconnection facility have been avoided and minimized through careful site selection. Further details on potential construction and operational impacts and proposed mitigation measures are described below.

4.3.4.1 Potential Construction Impacts and Mitigation

Visual impacts during construction are anticipated to be relatively minor and short-term. During construction, there will be a temporary increase in truck traffic on area roadways in the vicinity of the Project. Local residents, commuters, and visitors may experience views of these conventional construction vehicles on roadways and/or see them at work on site. During construction, the site will have a comparable appearance to a typical construction project. Additionally, roads may be temporarily closed or partially blocked off during construction of the SFEC-Onshore and the sea-to-shore transition corridor.

Construction of the SFEC-Interconnection Facility will be initiated by clearing woody vegetation from the site. Trees cleared from the work area will be removed and disposed of offsite. This will be a relatively small, but permanent, loss of forest habitat as well as the visual screening it provides. Following construction activities, temporarily disturbed areas around the periphery of the SFEC-Interconnection Facility will be seeded (and stabilized with mulch and/or straw if necessary) to reestablish vegetative cover in these areas per the SWPPP, as well as screening which will be detailed in the Project EM&CP.

Due to the temporary and relatively minor nature of the visual impacts associated with Project construction, no mitigation measures are proposed at this time.

4.3.4.2 Potential Operational Impacts and Mitigation

Once installed, the SFEC-Interconnection Facility is not anticipated to be visible within the visual study area 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 SFEC-Interconnection Facility will be generally limited to a few areas within approximately a quarter mile (0.40 km) of the site (Figure 4.3-2). Where visible, it is expected that views of the SFEC-Interconnection Facility from most of these areas will be limited to the uppermost portions of the lightning masts.

Due to the very limited potential visibility of the SFEC-Interconnection Facility from surrounding areas, no unobstructed open views nor potential views from visually sensitive sites, or any of the other considerations listed above, were identified within the visual study area (see Appendix B).

Four simulations were prepared during the VRA that illustrate the most open views of the SFEC-Interconnection Facility from publicly accessible vantage points (see Appendix B). Existing vegetation screens views of the SFEC-Interconnection Facility from nearby vantage points located in public ROWs. The only visible components of the SFEC-Interconnection Facility from these areas will be limited to the uppermost portions of the lightning masts due to thinning of existing vegetation. However, foreground vegetation that screens visibility of the SFEC-Interconnection Facility from public vantage points would not be removed. In addition, the visual simulations depict the most conservative potential height of the lightning masts (65.5 feet [20.0 m] tall). Shorter lightning masts would be visible from fewer locations/vantage points and would further minimize the visual effect of the Project. Therefore, the SFEC-Interconnection Facility would be even less visible, and have even less of an effect on the visual environment, from more distant vantage points.

As a result, operation of the SFEC-Interconnection Facility is not anticipated to result in significant changes to the existing visual character or scenic quality of the visual study area. Additional details on the potential operational impacts of the SFEC-Interconnection Facility are within the VRA (see Appendix B).

Maintenance impacts are anticipated to be similar to impacts during the construction phase, except at a smaller scale and less frequent.

NYSDEC Program Policy DEP-00-2 *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000) provides guidance for identifying and considering potential mitigation measures to reduce or eliminate the visibility of a project, or alter a project's effect on scenic or aesthetic resources. As described in that guidance, a properly sited and designed project is the best way to mitigate potential visual impacts. As indicated by the results of the analyses summarized above, visual impact of the SFEC-Interconnection Facility has been avoided and minimized through careful site selection. Due to the relatively small size and modest height of the SFEC-Interconnection Facility, and because the site is largely surrounded by forest, long distance views and views from visually sensitive resources have largely been avoided. Existing vegetation that will remain following construction also minimizes visual impact from adjacent sites (including residences). In addition, the SFEC-Interconnection Facility is sited adjacent to existing utility infrastructure, thereby avoiding the potential introduction of utility-related visual elements in areas where such facilities are not currently part of the landscape. The SFEC-Interconnection Facility will not be visible from or have a negligible visual effect on the aesthetic resources of statewide significance within the study area. By selecting this location for the SFEC-Interconnection Facility, the siting of the Project complies with the New York State CMP's Coastal Policy 24 to prevent impairment of scenic resources of statewide significance. Additional details on the consideration of mitigation measures for the SFEC-Interconnection Facility is included within Appendix B.

4.4 Cultural and Historic Resources

This section discusses cultural resources within the vicinity of the Project. For the purposes of this discussion, cultural resources are divided into two categories: historic resources, which consist of historically and/or architecturally significant structures, buildings, objects, and sites; and, archaeological resources, which consist of archaeological sites and isolated artifacts. Further, archaeological resources include sites or artifacts located on land (terrestrial archaeological resources) as well as underwater sites and artifacts (marine archaeological resources). It is important to note that both historic resources and archaeological resources can be listed on or eligible for the New York State and/or NRHP (S/NRHP). Review of the Project's potential effect on cultural resources included preparation of resource-specific studies (summarized below), as well as consultation with the NYSOPRHP in their role as the SHPO, the NYSPSC, the Wampanoag Tribe of Gay Head (Aquinnah), and the Mohegan Indian Tribe.

The Applicant prepared a Historic Architectural Resources Survey report (EDR, 2018b), which is included as Appendix C – Historic Architectural Resources Survey and summarized in the sections below. Construction of the Project will not require the demolition or physical alteration of any S/NRHP-eligible or S/NRHP-listed properties. No direct physical impacts to historic resources will occur because of construction or operation of the Project, as described in the sections below. A potential indirect effect of the Project on a given historic property will be a change in the property's visual setting resulting from the introduction of new electrical transmission infrastructure. Therefore, the area of potential effect (APE) for indirect (visual) effects on historic resources includes those areas where the Project will be visible and where there is a potential for change in the visual setting associated with historic properties as a result of Project visibility. The SFEC-Interconnection Facility is the only above-ground facility that will be built as part of the Project and is therefore the only part of the Project with the potential to cause visual impacts to historic resources. Therefore, the APE for indirect effects is restricted to areas where the SFEC-Interconnection Facility will be potentially visible.

In addition, the Applicant prepared a Phase 1 Archaeological Survey report (EDR, 2018c)(see Appendix D – Phase I Archaeological Survey) for the sea-to-shore transition corridor, the SFEC-Onshore, and the SFEC-Interconnection Facility. The Project's potential effect on a given terrestrial archaeological resource would be physical disturbance to the resource during construction. The APE for direct effects from the onshore construction and installation are the areas where soil disturbance is anticipated to occur, including the sea-to-shore transition corridor, the SFEC-Onshore corridor, and the SFEC-Interconnection Facility footprint.

The Applicant also prepared a *Marine Archaeology Resources Assessment* report for federal permitting of activities on the outer continental shelf (OCS) (Gray & Pape, 2018). The results and interpretations from the technical report regarding potential impacts to marine archaeological resources in the SFEC-NYS corridor are summarized below. The marine archaeological survey evaluates the potential for direct effects caused by the SFEC-NYS construction and installation. The marine archaeological survey was conducted for the SFWF, the SFEC-OCS, and the SFEC-NYS. Most portions of the APE for direct effects evaluated in the marine archaeological survey are in federal waters. The summary included herein addresses only the SFEC-NYS corridor.

4.4.1 Existing Cultural and Historic Resources

This section describes existing terrestrial and marine cultural and historic resources identified through desktop research, agency coordination, and field surveys of the study area.

4.4.1.1 Terrestrial Cultural and Historic Resources

Terrestrial Historic Architectural Resources

The Applicant conducted a historic resources survey for the APE for indirect effects associated with the SFEC-Interconnection Facility (see Appendix C). The purpose of the historic resources survey was to identify and document buildings within the APE for indirect effects of the SFEC-Interconnection Facility that satisfy S/NRHP eligibility criteria. Historically significant properties include buildings, districts, objects, structures and/or sites that have been listed on the S/NRHP, as well as those properties that NYSOPRHP has formally determined are eligible for listing on the S/NRHP. Criteria for evaluating historic properties are set forth by the NPS in 36 CFR 60.4 which is summarized in the Appendix C. A qualified architectural historian who meets the United States Secretary of Interior's Standards for Historic Preservation Projects (36 CFR Part 61) conducted the historic architectural resources survey.

The Applicant initiated consultation with SHPO via the Cultural Resources Information System website on March 10, 2017. In addition, the Applicant met with SHPO staff to discuss the anticipated scope of cultural resources studies for the Project on March 21, 2017. At the meeting, attendees discussed historic architectural resources and the Applicant proposed a one mile (2 km) study area/APE for indirect effects of the SFEC-Interconnection Facility, based on the anticipated limited visibility of the SFEC-Interconnection Facility. The SHPO concurred with the one-mile historic resources survey area.

The historic resources survey included reviews of databases, repositories, written histories, and mapping within the one mile (2 km) survey area, as well as consultation with NYSOPRHP, site visits to identify and evaluate potential historic resources within the survey area, and supplemental research on specific historic properties as necessary. The full methodology employed during the historic resource survey is described in Appendix C.

The historic resources survey fieldwork was completed in May 2017. Fieldwork included systematically driving all public roads within the one mile (2 km) survey area to photograph and evaluate the S/NRHP eligibility of previously recorded structures and properties. When the Applicant identified previously unrecorded resources which appeared to satisfy S/NRHP eligibility criteria, the architectural historian documented the existing conditions of those properties. This included photographs of the building(s) (and associated property when necessary) and field notes describing the style, physical characteristics, and materials (e.g. number of stories, plan, external siding, roof, foundation, and sash), condition, physical integrity, and other noteworthy characteristics for each resource. The evaluation of historic resources within the survey area focused on the physical condition and integrity (with respect to design, materials, feeling, and association) of each resource to assess its potential architectural significance.

Potential impacts to historic resources are only considered for the SFEC-Interconnection Facility, because the SFEC-Interconnection Facility is the only part of the Project that will be visible. As described in Section 4.3, *Visual and Aesthetic Resources*, given the density of vegetation and standing structures in the existing landscape, visibility of the SFEC-Interconnection Facility from further than one mile (2 km) away will be negligible.

Previously recorded historic resources within one mile (2 km) of the SFEC-Interconnection Facility are summarized in Table 4.4-1 – Historic Resources Within One Mile of the SFEC-Interconnection Facility. In total, three S/NRHP-listed historic districts, one S/NRHP-listed historic resource, three S/NRHP-eligible historic resources, and five S/NRHP-unevaluated historic resources occur within one mile (2 km) of the SFEC-Interconnection Facility. The locations of these historic properties are included on Figure 4.3-1.

Table 4.4-1 Historic Resources Within One Mile of the SFEC-Interconnection Facility

Unique Site Number (USN)/Bridge Identification Number (BIN)	Property Name and Address	Municipality	Previously Determined NRHP-Status (NYSOPRHP)
90NR01933	East Hampton Village Historic District	Village of East Hampton	NRHP-Listed
90PR05285	Buell's Lane Historic District	Village of East Hampton	NRHP-Listed
90NR01937	Jericho Historic District	Village of East Hampton	NRHP-Listed
99NR01544	East Hampton Railroad Station Railroad Avenue	Village of East Hampton	NRHP-Listed
02713.000072	Josiah Dayton House 35 Toilsome Lane	Village of East Hampton	NRHP-Eligible

Unique Site Number (USN)/Bridge Identification Number (BIN)	Property Name and Address	Municipality	Previously Determined NRHP-Status (NYSOPRHP)
10372.000237	Miller Dayton House 19 Toilsome Lane	Village of East Hampton	NRHP-Eligible
10303.000722	Sinclair Lewis / Wrenn House 192 Cove Hollow Road	Village of East Hampton	NRHP-Eligible
N/A	Cedar Lawn Cemetery McGuirk Street at Cooper Lane	Village of East Hampton	Undetermined
N/A	Jericho Road Burial Ground Jericho Road	Village of East Hampton	Undetermined
BIN 7710290	Railroad Bridge Cove Hollow Road at Railroad Crossing	Town of East Hampton	Undetermined
BIN 7037050	Railroad Bridge Sag Harbor Turnpike at Railroad Crossing	Town of East Hampton	Undetermined
BIN 1170280	Railroad Bridge Stephen Hands Path at Railroad Crossing	Town of East Hampton	Undetermined

Terrestrial Archaeological Resources

The Applicant conducted an archaeological survey for the sea-to-shore transition corridor, the SFEC-Onshore corridor, and the SFEC-Interconnection Facility in order to evaluate potential direct effects of Project construction and installation to archaeological resources (see Appendix D).

The terrestrial archaeological survey was conducted under the supervision of a Registered Professional Archaeologist in accordance with the New York Archaeological Council's *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York State* (NYAC, 1994), as well as under a valid NYSOPRHP *Access Permit for Data Collection and Land Investigations* (approved on May 2, 2017) and valid New York State Education Department/NYSM Section 233 Permit *Application for Authorization to Collect and Excavate Archeological or Paleontological Materials on State Lands* (approved on April 21, 2017 and September 8, 2017).

The Phase 1 archaeological survey included archival research and archaeological fieldwork. Background research was conducted to review the geology and environmental setting, previously reported archaeological sites and archaeological surveys, regional histories, and historic maps of the study area. These sources were reviewed to prepare historic contexts for the pre-contact and post-contact historic periods and assess the archaeological sensitivity of the APE for direct effects. In addition, reconnaissance-level surveys were conducted by archaeologists to evaluate existing conditions and prior ground disturbance as part of assessing the potential for archaeological resources to be present within the APE. In addition, shovel testing and systematic pedestrian surveys of the sea-to-shore transition corridor and the SFEC-Interconnection Facility site were conducted. Pedestrian surveys were conducted along the pavement of the public road ROWs of the SFEC-Onshore and along the LIRR ROW portion of the SFEC-Onshore.

Previously recorded terrestrial archaeological resources within one mile (2 km) of the Project are summarized in Table 4.4-2 – Terrestrial Archaeological Resources Within One Mile of the Project. There are four previously recorded archaeological sites within one mile (2 km) of the terrestrial portion of the Project. They consist of one ceremonial place, traces of occupation, a workshop, and historical records of an archaeological site for which no substantive information is readily available. None of the archaeological resources are listed on the S/NRHP and all four are unevaluated/undetermined in terms of their eligibility for listing on the S/NRHP.

Table 4.4-2 Terrestrial Archaeological Resources within One Mile of the Project

Site Number	Site Name	NRHP-Eligibility	Time Period	Site Type
New York State Museum (NYSM) 4912	Sachems Hole	Undetermined	Pre-contact	Ceremonial place
NYSM 4924	NYSM 4924	Undetermined	Pre-contact	Traces of occupation
10303.000054	Georgica Pond Sites	Undetermined	Pre-contact	Unknown
10303.000360	Burnt Pond Site	Undetermined	Pre-contact	Woodland period workshop

It is important to note that two of the previously recorded archaeological resources are NYSM areas (NYSM Areas 4912 and 4924). NYSM areas consist of large polygons typically based on early twentieth century records. In most cases, these polygons indicate areas of elevated archaeological sensitivity, and should not be considered equivalent to formally tested and delineated archaeological sites.

Further discussion of the Phase 1 archaeological survey for the sea-to-shore transition corridor, SFEC-Onshore corridor, and SFEC-Interconnection Facility are summarized below.

Sea-to-Shore Transition Corridor: The sea-to-shore transition corridor is bordered to the north by a residential neighborhood, on the east and west by beach and residences, and on the south by the Atlantic Ocean. A portion of the site consists of an asphalt-paved parking area bounded by shrub/scrub vegetation, adjacent to a public beach. The sea-to-shore transition will be sited beneath the beach to connect to the transition vault within paved Beach Lane roadway. No previously recorded archaeological sites are located within or adjacent to the sea-to-shore transition study area. As described in the Phase 1 archaeological survey (Appendix D), the sea-to-shore transition corridor has been affected by severe erosion from past storm events. Recovery and redevelopment of the shoreline following each of these storms may have further affected the APE, as overwash deposits were removed and artificial dunes constructed to afford some protection to new buildings and roads.

Archaeologists excavated six shovel tests at 25-feet (8 m) intervals within the sea-to-shore transition corridor, adjacent to the edges of the paved parking lot. In addition, archaeologists conducted a complete pedestrian survey of the beach front within the sea-to-shore transition corridor. Shovel tests were hand excavated with shovels and, where feasible, a bucket (or Dutch) auger was used to further assess the soil stratigraphy in the location. Soils observed in shovel tests were consistent with the historical record of prior soil disturbance in this area. No pre-contact Native American or post-contact period artifacts were recovered from the shovel tests excavated within the APE. Additionally, no features, structures, or artifacts were noted during pedestrian survey of the beach front.

SFEC-Onshore Corridor – Public Road ROWs: Within public road ROWs, the SFEC-Onshore will be buried in a trench from the from the transition vault to the LIRR ROW. Wherever practicable, the SFEC-Onshore will run within the existing paved section of public road ROWs. The exact location of this trench within the various roadways that are being considered for the SFEC-Onshore corridor has not yet been determined and will be detailed within the Project EM&CP. Therefore, for the purpose of evaluating the potential archaeological sensitivity of the SFEC-Onshore within paved roads, the archaeological evaluation included the entire width of a given segment of paved roadway (i.e. pavement edge to pavement edge).

The Applicant evaluated the archaeological sensitivity of the portions of the SFEC-Onshore corridor within public road ROWs by reviewing historic maps and aerial photos, historical sources, previous archaeological surveys, an interview with the Superintendent of Highways for the Town of East Hampton, mapped soils data, topographic survey, light detection and ranging data, mapping of buried utilities, and on-site survey. As described in the Phase 1 archaeological survey report, the original construction and maintenance of local roadways within the Town of East Hampton did not typically involve significant ground disturbance. In sloped or rolling areas, the roads have often been cut into the natural ground surface, or elevated above it; however, in flatter areas, the roads essentially follow the natural ground surface. In some locations ditches are present along road shoulders, typically away from the Village of East Hampton and in the more rural areas. Ground disturbance related to existing utilities (such as gas or water) located adjacent or within roadways is also minimal throughout East Hampton. This analysis suggests that while some portions of area roadways have been previously disturbed, other areas have likely been built with relatively shallow soil disturbance.

SFEC-Onshore Corridor – LIRR ROW: Within the LIRR ROW, the SFEC-Onshore will be installed below ground in a trench adjacent to the existing railroad tracks within the previously disturbed LIRR ROW. The Phase 1 archaeological survey report included a review of the history of the portions of the LIRR ROW within the APE for direct effects, review of previous archaeological surveys within/adjacent to the LIRR ROW, a site survey to review existing conditions, and an evaluation of archaeological sensitivity.

The results of historical research, review of prior archaeological surveys, and pedestrian survey of the portions of the APE located within the LIRR ROW have determined that this portion of the APE is previously disturbed. Conditions within the LIRR ROW reflect the extensive terrain modification associated with the development of this area, with visible disturbance adjacent to and within the existing LIRR ROW. Generally, the railroad corridor was found to be significantly disturbed by the grading, cutting, and filling associated with the construction of the LIRR. Visible disturbance included locations where the railroad had been cut (or depressed) into the surrounding terrain (in some cases up to approximately 15-20 feet [5-6 m] below the adjacent landforms), as well as areas where the railroad was built on an elevated berm (up to approximately 15 feet [5 m] above the surrounding terrain).

SFEC-Interconnection Facility Site: The SFEC-Interconnection Facility site is bordered to the north by an active railroad, on the west and south by deciduous woods, and on the east by the existing East Hampton Substation. Berms, pushpiles, and road cuts from previous logging activities are visible throughout the surrounding area, and vegetation within the SFEC-

Interconnection Facility site consists of deciduous secondary growth with moderate to thick herbaceous and woody undergrowth. No previously recorded archaeological sites are located within or adjacent to the SFEC-Interconnection Facility site.

Archaeologists excavated 33 shovel tests at 50-feet (15 m) intervals within the SFEC-Interconnection Facility footprint. No artifacts or other indications of an archaeological site were recovered or identified in the shovel tests excavated within the APE and no further archaeological work is recommended for this area.

4.4.1.2 Marine Cultural and Historic Resources

Marine Historic Architectural Resources

No evidence of historic maritime infrastructure, such wharves, docks, or piers was identified during archival research for the SFEC-NYS corridor.

Marine Archaeological Resources

To assess the presence of previously recorded marine archaeological resources near the SFEC-NYS, the NOAA's Office of Coastal Survey Automated Wreck and Obstruction Information System (AWOIS) database, electronic navigational charts database, and the proprietary Bureau of Ocean Energy Management (BOEM) shipwreck database were queried for all areas within one mile (2 km) of the SFEC-NYS. In addition, site file and shipwreck data at the SHPO was reviewed within one mile (2 km) of the SFEC-NYS.

Based on this review, four shipwrecks were reported in the SHPO records at the eastern end of Long Island, from East Hampton to Montauk Point. All four SHPO-inventoried wrecks are located more than 3 nautical miles (5.6 km) from the SFEC-NYS corridor. Data from NOAA's AWOIS database indicated that one shipwreck (AWOIS Record 7248) was reported approximately 500 feet (152 m) offshore, south-southeast of the sea-to-shore transition at Beach Lane. The AWOIS database describes Record 7248 as an unknown "Wreck – Visible" vessel with the following description: "HISTORY NM 15/62-A DERELICT HULK PARTIALLY UNCOVERED AT HIGHWATER IS LOCATED IN PA LAT 40-55-36N, LONG 72-14-00W (ENTERED MSM 4/89)" (NOAA, 2018). AWOIS indicates that the "Positional Accuracy" for this record is "Low", indicating low confidence in the mapped location of this wreck. No other shipwreck locations are reported within areas subject to direct effects from construction of the SFEC-NYS.

A marine archaeological survey was conducted for the SFEC-NYS to ensure that no potentially significant marine cultural resources will be inadvertently affected by construction or operation of the SFEC-NYS. Archival research and field surveys were conducted for the areas within the SFEC-NYS corridor, which encompasses the APE for direct effects. Background research included a review of historic documents, previous research reports, state site files, shipwreck inventories, and historic maps. Site files and shipwreck data at the SHPO were accessed and reviewed. The Applicant also reviewed relevant geological and paleo environmental research to assist in the reconstruction of environmental conditions during the periods of potential pre-contact land use. Field surveys included a high-resolution geophysical survey utilizing magnetometer, side scan sonar, and sub-bottom profiler to search for the presence of marine archaeological resources within the SFEC-NYS corridor (see Appendix G – Geophysical and Shallow Hazards Report, Chart SFEC-14). Geotechnical surveys were also conducted along the offshore portion of the SFEC-NYS corridor, in which vibracores were collected to characterize the sub-bottom conditions (see Appendix G – Geotechnical and Geophysical Data Reports).

Geophysical survey of the SFEC-NYS corridor was conducted along a centerline and three parallel transects, spaced 30 m (98 feet) apart, on either side of the centerline for a total survey width of 180 m (598 feet). The survey area was widened to approximately 0.9 miles (1.5 km) parallel to the shoreline between one km (0.6 miles) and the nearshore limit of survey. Survey operations were conducted during daylight hours from July 27 through August 16, 2017.

4.4.2 Potential Cultural and Historic Resources Impacts and Proposed Mitigation

The Project has been designed to minimize impacts to cultural resources. Potential visibility and visual effects resulting from construction and operation of the SFEC-Interconnection Facility has been avoided and minimized through careful site selection. Due to the relatively small size and modest height of the SFEC-Interconnection Facility, and because the site is largely surrounded by forest, the SFEC-Interconnection Facility will not be visible from historic properties. Existing vegetation that will remain following construction also minimizes visual impact from adjacent sites (including residences). In addition, the SFEC-Interconnection Facility is sited adjacent to existing utility infrastructure, thereby avoiding the potential introduction of utility-related visual elements in areas where such facilities are not currently part of the landscape.

In addition, the SFEC-Onshore will be sited within previously disturbed public road and railroad ROWs and will be installed completely underground. The selection of a buried cable (as opposed to an overhead transmission line) avoids potential visual impacts (including visual impacts to historic properties). The Applicant has elected to site the SFEC-Onshore buried cable within previously disturbed areas, including paved roadway (where practicable) and the LIRR ROW, which avoids potential impacts to adjacent undisturbed soils and helps to minimize the risk of encountering undisturbed archaeological deposits.

Additionally, no marine archaeological resources have been identified within the SFEC-NYS corridor. The selection of a buried cable (as opposed to an overhead transmission line) avoids potential visual impacts (including visual impacts to historic properties).

4.4.2.1 Potential Construction Impacts and Mitigation

<u>Terrestrial Historic Resources</u>

During the historic resources survey, the Applicant identified three previously unrecorded historic resources and one previously unrecorded historic district that are recommended as eligible for listing on the S/NRHP, in addition to the previously recorded historic resources and districts discussed in Section 4.4.1.1, *Terrestrial Cultural and Historic Resources*. Construction of the Project will not require the demolition or physical alteration of any S/NRHP-eligible or S/NRHP-listed buildings. In addition, no temporary effects to historic properties resulting from construction activities are anticipated.

Construction of the SFEC-Interconnection Facility could have a visual effect on a given historic property if visibility of the SFEC-Interconnection Facility resulted in a change to the property's visual setting. The potential visibility of the SFEC-Interconnection Facility from S/NRHP-listed or eligible historic resources is summarized in Table 4.4-3 – Visual Effects Analysis for S/NRHP-listed and S/NRHP-eligible Historic Resources Within One Mile of the SFEC-Interconnection Facility.

Table 4.4-3 Visual Effects Analysis for S/NRHP-listed and S/NRHP-eligible Historic Resources Within One Mile of the SFEC-Interconnection Facility

USN/BIN	Historic Resource Name, Address, Municipality	NRHP Eligibility Recommendation	Distance to SFEC-Interconnection Facility (mi)	Potential SFEC-Interconnection Facility Visibility (Based on Viewshed Analysis)	Potential SFEC-Interconnection Facility Visibility (Based on Field Review)
90NR01933	East Hampton Village Historic District	NRHP-Listed	0.6 (1.0 km)	Not Visible	Not Visible
90PR05285	Buell's Lane Historic District	NRHP-Listed	0.2-0.5 (0.3-0.8 km)	Partially Visible	Not Visible
90NR01937	Jericho Historic District	NRHP-Listed	0.6 (1.0 km)	Not Visible	Not Visible
99NR01544	East Hampton Railroad Station Railroad Avenue	NRHP-Listed	0.9 (1.4 km)	Partially Visible	Not Visible
02713.000072	Josiah Dayton House 35 Toilsome Lane	NRHP-Eligible Resource (Applicant Recommended)	0.5 (0.8 km)	Not Visible	Not Visible
10372.000237	Miller Dayton House 19 Toilsome Lane	NRHP-Eligible Resource (NYSOPRHP Determined)	0.5 (0.8 km)	Not Visible	Not Visible
10303.000722	Sinclair Lewis / Wrenn House 192 Cove Hollow Road	NRHP Eligibility Unknown	0.7 (1.1 km)	Not Visible	Not Visible
N/A	Cedar Lawn Cemetery McGuirk Street at Cooper Lane	NRHP-Eligible Resource (Applicant Recommended)	0.9 (1.4 km)	Not Visible	Not Visible
N/A	Jericho Road Burial Ground Jericho Road	NRHP-Eligible Resource (Applicant Recommended)	0.8 (1.3 km)	Not Visible	Not Visible
BIN 7710290	Railroad Bridge Cove Hollow Road at Railroad Crossing	NRHP-Eligible Resource (Applicant Recommended)	0.2 (0.3 km)	Partially Visible	Not Visible
BIN 7037050	Railroad Bridge Sag Harbor Turnpike at Railroad Crossing	NRHP-Eligible Resource (Applicant Recommended)	0.3 (0.5 km)	Partially Visible	Not Visible

USN/BIN	Historic Resource Name, Address, Municipality	NRHP Eligibility Recommendation	Distance to SFEC-Interconnection Facility (mi)	Potential SFEC-Interconnection Facility Visibility (Based on Viewshed Analysis)	Potential SFEC-Interconnection Facility Visibility (Based on Field Review)
BIN 1170280	Railroad Bridge Stephen Hands Path at Railroad Crossing	NRHP-Eligible Resource (Applicant Recommended)	0.9 (1.4 km)	Not Visible	Not Visible
N/A	180 Sag Harbor Turnpike- J.F Dayton House	NRHP-Eligible Resource (Applicant Recommended)	0.8 (1.3 km)	Not Visible	Not Visible
N/A	84 Sag Harbor Turnpike- C.R. Dayton House	NRHP-Eligible Resource (Applicant Recommended)	0.3 (0.5 km)	Partially Visible	Not Visible
N/A	2 Montauk Highway- Georgica Exxon	NRHP-Eligible Resource (Applicant Recommended)	0.5 (0.8 km)	Not Visible	Not Visible
N/A	Newtown Lane Historic District (suggested name)	NRHP-Eligible Resource (District) (Applicant Recommended)	0.7-1.0 (1.1-1.6 km)	Not Visible	Not Visible

As shown in Table 4.4-3, the SFEC-Interconnection Facility will not be visible from any historic properties. Furthermore, as described in Section 4.3, *Visual and Aesthetic Resources*, the results of the VRA conducted for the SFEC-Interconnection Facility indicated that potential visibility of the SFEC-Interconnection Facility will be limited to areas immediately adjacent (i.e. within approximately 0.25 miles [0.40 km]) of the substation. Views of the SFEC-Interconnection Facility will be limited to the uppermost portions of the lightning masts, which even if visible, will be difficult to distinguish on the horizon due to their narrow profile and gray color. Construction of the SFEC-Interconnection Facility will not result in a significant change in the visual character or aesthetic quality of the area. Therefore, the SFEC-Interconnection Facility will not have a significant effect on the visual setting associated with historic resources. No mitigation is warranted or anticipated for impacts to historic resources associated with the construction of the Project.

<u>Terrestrial Archaeological Resources</u>

No archaeological resources were identified within the APE of the Project.

Based on the results of the Phase 1 archaeological survey, no terrestrial archaeological sites are located at the sea-to-shore transition corridor, the SFEC-Interconnection Facility or along the LIRR ROW. Therefore, negligible impacts are anticipated to terrestrial archaeological resources as a result of construction in these areas. No additional archaeological surveys or considerations are recommended for the portions of the APE located within these areas.

The SFEC-Onshore within road ROWs will be constructed within existing paved roadway sections to the extent practicable. Given that existing roadways include some degree of prior ground disturbance, siting the SFEC-Onshore site within roadways helps to minimize the risk of encountering undisturbed archaeological deposits. However, sub-surface archaeological testing has not been undertaken within or along the SFEC-Onshore within public roadways. These areas are active, public roadways and the overlying pavement will be removed as part of construction activities. Removing the pavement to conduct archaeological testing prior to construction is not feasible, given the expenses and logistical arrangements that will be required (e.g. the need for re-routing traffic and potentially emergency vehicles). Therefore, the most effective way to evaluate the likelihood for archaeological sites to be located under paved roadways within the APE is to conduct archaeological testing within the grassy/unpaved portions of the road ROWs adjacent to the pavement. To further evaluate the potential for archaeological sites to be present within the SFEC-Onshore corridor, the Applicant intends to undertake additional Phase 1 archaeological surveys within existing road ROWs. The proposed archaeological survey will be conducted along shoulder areas adjacent to the pavement. Additional details on the anticipated Phase I archaeological survey along the SFEC-Onshore is included within Appendix D.

Prior to installation, in the event any archaeological sites are identified adjacent to the paved roadway portions of the APE, the Applicant will review additional measures to avoid those resources or conduct additional archaeological investigations to further evaluate the significance of the identified site. In addition, an Unanticipated Discovery Plan will be implemented that will include stop-work and notification procedures to be followed if a cultural resource is encountered.

Marine Archaeological Resources

The marine archaeological survey included evaluation of 8,402 acres (3,400 ha) along the SFEC corridor, inclusive of federal and New York State territorial waters. Geologic data indicates that the Project area was dry land during the last glaciation and for several millennia after the ice retreated. The area was progressively inundated by rising seas following the last glaciation. Western sections of the SFEC-NYS were the last portions of the study to experience marine transgression with nearshore segments along the current shoreline being inundated less than 8,000 years ago. The SFEC contains areas that may have been inhabited by Native Americans prior to submergence.

Archival research indicates that there are no archaeological reports for this specific area or adjacent offshore locations that provide evidence of pre-contact archaeological resources. Geophysical data indicates a low potential for intact paleo landforms to be present due to extensive reworking of nearshore deposits along the open-ocean shoreline. Although sea level reconstructions indicated terrestrial landforms may have been present within the SFEC-NYS during the Paleoindian and Archaic periods, geophysical data indicated a low potential for these landforms to have survived marine transgression and subsequent erosion/redeposition.

Based on review of geophysical survey data and in coordination with regional Indian Tribes, multiple areas were identified for geotechnical vibracoring along the FEC-OCS corridor. No vibracoring was undertaken specifically within the SFEC-NYS sections for potential marine archaeological resources, but multiple cores were collected for geologic characterization. Detailed analysis of the cores from these locations was consistent with the geophysical data and indicated a low potential for the preservation of intact submerged marine archaeological resources within the SFEC-NYS corridor (Gray & Pape, 2018). The south shore setting is characterized by a relatively high energy sub-bottom environment. Sediments within the anticipated depth of disturbance from Project activities have been affected by open ocean wave action and tidal and longshore currents. No intact paleo landforms are anticipated in the SFEC-NYS APE. The analyses completed for the marine archaeological assessment suggest the potential for pre-contact archaeological resources to be preserved within the SFEC-NYS corridor is low. Therefore, no impacts to submerged pre-contact archaeological resources are anticipated as a result of construction of the SFEC-NYS.

Historical and other archival sources indicate several shipwrecks and aircraft losses off the coast of Long Island. As described in Section 4.4.1, *Existing Cultural and Historic Resources*, the AWOIS database includes a record of one wreck adjacent to the SFEC-NYS corridor, a partially submerged “derelict hulk” of an unknown vessel was reported approximately 500 feet (152 m) offshore from Beach Lane Town beach in 1989 (AWOIS Record 7248; NOAA, 2018). Geophysical survey, utilizing magnetometer, side scan sonar, and sub-bottom profiler, were used to locate potential undocumented shipwreck sites within and adjacent to the study area. No wreck sites were identified along the SFEC-NYS corridor. No indications of AWOIS Record 7248 were identified. No evidence of unreported shipwrecks or other post-contact archeological sites was identified within the SFEC-NYS corridor during the geophysical or geotechnical surveys. Therefore, no impacts to submerged shipwrecks or other post-contact archaeological sites are anticipated as a result of construction of the SFEC-NYS.

The Applicant has committed to avoid or minimize impacts to potential marine archaeological resources to the extent practicable.

An Unanticipated Discovery Plan will be implemented that will include stop-work and notification procedures to be followed if a marine archaeological resource is encountered during Project construction.

4.4.2.2 Potential Operational Impacts and Mitigation

Terrestrial Historic Resources

Operation of the SFEC-Interconnection Facility will not result in any direct impacts, including demolition or alteration, to any S/NRHP listed- or eligible- buildings, nor any other potential historic architectural resources. In addition, as described previously, the SFEC-Interconnection Facility will not be visible from, nor affect the visual setting of historic properties. No mitigation measures associated with impacts to historic properties are necessary for the SFEC-Interconnection Facility.

Terrestrial and Marine Archaeological Resources

Operation of the Project is not anticipated to result in potential impacts to archaeological sites. Therefore, no mitigation for archaeological sites is necessary due to Project operation.

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 SFEC-Onshore, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility. 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 geology along the SFEC-NYS is provided in Section 4.8, *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 existing published data and a literature review within a 500-feet (152 m) study area surrounding the sea-to-shore transition corridor, SFEC-Onshore corridor, and the SFEC-Interconnection Facility.

4.5.1.1 Topography

The topography along the SFEC-Onshore, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility (see Figure 4.5-1 –Topography) is based on a review of the USGS topographic quadrangle for East Hampton, New York. The approximate topographic elevation along the onshore portion of the Project ranges from zero feet (0 m) amsl at the sea-to-shore transition corridor to approximately 54 feet (16 m) amsl at the SFEC-Interconnection Facility. Although a majority of the natural topography along the SFEC-Onshore and the sea-to-shore transition corridor can be defined as gently sloping (i.e. areas where topography remains relatively flat), instances of more moderate slopes along the SFEC-Onshore are evident. These more moderately sloping areas include the previously disturbed lands proximate to the SFEC-Onshore's intersection with the LIRR and Town of East Hampton roadways.

4.5.1.2 Geology

As indicated in Exhibit 2: Location of Facilities, the SFEC-NYS crosses into New York State territorial waters three nm off the coast. The segment is located within the Coastal Plain physiographic province, which marks the southernmost boundary of the extensive ice sheets that covered the eastern United States during the Pleistocene epoch (NOAA CSC, 2017).

The Pleistocene epoch is divided into four major glacial stages: Nebraskan, Kansan, Illinoian, and Wisconsin. The youngest stage is the Wisconsin, which was 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, New York and stopped, leaving before it two terminal moraines, which are now known as the Ronkonkoma moraine and the Harbor Hills moraine (USDA SCS, 1975). 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 was deposited in two relatively flat outwash plains; one between the Ronkonkoma moraine and the Atlantic Ocean, where the South Fork of Long Island and the Town of East Hampton are located, and the other between the Harbor Hill moraine, which extends from the western edge of Nassau County, along the north 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 (USGS, 2017) (Allgaier, 2017). The underlying bedrock beneath these sedimentary deposits consists mainly of gneissic metamorphic bedrock (NYSGS, 1989).

Depth to bedrock, proximate to the SFEC-Onshore, ranges from approximately 1,400 feet (427 m) below ground surface (bgs) at the sea-to-shore transition corridor to approximately 1,300 feet (396 m) bgs at the SFEC-Onshore's intersection with the LIRR ROW (USGS, 1995).

4.5.1.3 Soils

The soils along the SFEC-Onshore, the sea-to-shore transition corridor and at the SFEC-Interconnection Facility 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 predominant soil series found along the SFEC-Onshore corridor, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility include Bridgehampton, Carver, and Plymouth series and are discussed below.

Bridgehampton Series

The Bridgehampton series consists of deep, well drained to moderately drained, medium-textured soils that formed in thick silty deposits over coarse sand and gravel. Bridgehampton soils are only in the South Fork of Suffolk County in an area extending eastward from the Village of Southampton to Amagansett. These soils are generally nearly level to gently sloping and are mainly on flat outwash plains, but a small area of these soils near Montauk is on uneven moraines, and slopes as much as 12 percent. Native vegetation is red, white, and black oak, white ash, red maple, white pine, and red pine.

In a representative profile, the surface layer is dark-brown silt loam approximately 11 inches (28 centimeters [cm]) thick. The upper part of the subsoil is yellowish-brown and light olive-brown friable silt loam, which extends to a depth of about 23 inches (58 cm). The central part of the subsoil is friable, olive silt loam that contains grayish-brown and yellowish-brown mottles, which extend to a depth of about 34 inches (86 cm). The lower part of the subsoil is a strong-brown friable silt loam and very fine sandy loam that contains yellowish-brown and olive-gray streaks. The lower part of the subsoil extends to a depth of about 56 inches (142 cm). The substratum is yellowish-red to yellowish-brown loose sand and gravel which extends to a depth of about 80 inches (203 cm).

Bridgehampton soils have a high available moisture capacity. Natural fertility is low. Permeability is moderate in the silt loam layers, very rapid in the sandy substratum, and moderately slow in the till substratum of the till phases. Because of the difference in grain size between the lower part of the subsoil and the substratum, water does not move freely between those two layers. In places, this condition causes temporary water-logging in the lower subsoil during wet periods.

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 ranges from zero 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 about three inches (8 cm) thick. The subsurface layer is gray or light-gray loose sand to a depth of about 22 inches (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 about 22 inches (56 cm). The substratum is loose sand that contains some gravel and extends to a depth of about 60 inches (152 cm). The substratum is light yellowish brown to brown-yellow to a depth of about 31 inches (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, about four inches (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 about ten inches (25 cm) thick. The subsoil is yellowish-brown and brown, very friable and loose loamy sand to a depth of about 27 inches (69 cm). The substratum, to a depth of about 58 inches (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.

The mapping units present along and within 500 feet (152 m) of the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility, according to the Natural Resource Conservation Service's (NRCS) Web Soil Survey, are depicted in Table 4.5-1 – NRCS Mapped Soils and Figure 4.5-2 – Soil Classifications. Existing soils along these corridors include native soils and gravel pits. Existing soils in the area where the SFEC-Interconnection Facility will be located include Bridgehampton silt loam, zero to two percent slopes; Carver and Plymouth sands, three to 15 percent slopes; and Plymouth loamy sand, silty substratum, zero to three percent slopes.

A thorough discussion of agricultural districts proximate to the Project, and potential impacts on same, are presented in Section 4.2, *Land Use*.

Table 4.5-1 NRCS Mapped Soils

Soil Types	Slopes	Depth to Water Table (cm)	Drainage	Hydric	Percentage Within 500 Feet Buffer Area [a]
Beaches (Bc)	*	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	0.8 percent
Berryland mucky sand (Bd)	*	8 (3 inches)	Very poorly drained	Hydric (95 percent)	0.3 percent
Bridgehampton silt loam (BgA)	0—2 percent	>200 (79 inches)	Well drained	Not hydric (0 percent)	19.2 percent
Bridgehampton silt loam (BgB)	2—6 percent	>200 (79 inches)	Well drained	Not hydric (0 percent)	0.0 percent [b]
Carver and Plymouth sands (CpA)	0—3 percent	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	36.5 percent
Carver and Plymouth sands (CpC)	3—15 percent	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	18.2 percent
Gravel pits (Gp)	*	>200 (79 inches)	--	Not hydric (0 percent)	1.5 percent
Haven loam (HaA)	0—2 percent	>200 (79 inches)	Well drained	Not hydric (0 percent)	2.8 percent
Haven loam (HaB)	2—6 percent	>200 (79 inches)	Well Drained	Not hydric (0 percent)	0.4 percent
Hooksan-Dune land complex (HDR)	3—15 percent	>200 (79 inches)	Excessively drained	Hydric (5 percent)	0.3 percent

Soil Types	Slopes	Depth to Water Table (cm)	Drainage	Hydric	Percentage Within 500 Feet Buffer Area [a]
Plymouth loamy sand (PlA)	0-3 percent	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	11.5 percent
Plymouth loamy sand, silty substratum (PsA)	0-3 percent	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	7.0 percent
Plymouth loamy sand, silty substratum (PsB)	3-8 percent	>200 (79 inches)	Excessively drained	Not hydric (0 percent)	1.0 percent
Riverhead sandy loam (RdA)	0-3 percent	>200 (79 inches)	Well drained	Not hydric (0 percent)	0.4 percent

[a] Does not equal 100 percent due to rounding.
[b] Represents a 0.3 acre (0.1 ha) coverage area.
* The United States Department of Agriculture NRCS does not define slopes for this soil type.

4.5.1.4 Groundwater

Long Island is considered a sole source aquifer region, meaning groundwater is the single drinking water source. According to the NYSDEC, "[t]he aquifers underlying Long Island are among the most prolific in the country... The three most important Long Island aquifers are the Upper Glacial Aquifer, the Lloyd Aquifer, and the Magothy Aquifer" (NYSDEC, 2017e).

Groundwater flow on Long Island is characterized by a groundwater divide, extending east-west along the length of the Island. To the north of the groundwater divide, horizontal groundwater flow is generally to the north; in areas south of the divide, it groundwater flows toward the south. Review of the USGS Water Table and Potentiometric-surface Altitudes in the Upper Glacial, Magothy, and Lloyd Aquifers beneath Long Island, New York, April-May 2013 (Como, et al., 2015) indicates that groundwater along the sea-to-shore transition corridor, the SFEC-Onshore corridor and at the SFEC-Interconnection Facility generally flows both downward and horizontally to the south, toward the Atlantic Ocean, and ranges from a depth of zero feet (0 m) bgs at the sea-to-shore transition corridor to approximately 40 feet (12 m) bgs at the SFEC-Interconnection Facility (see Figure 4.5-3 – Depth of Groundwater).

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.

4.5.2.1 Potential Construction Impacts and Mitigation

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

Topography

As discussed in Section 4.5.1.1, *Topography*, topographic slope along a majority of the SFEC-Onshore corridor, the sea-to-shore transition corridor, and at the SFEC-Interconnection Facility can be defined as gently sloping; areas of more moderate slopes will only be encountered in areas where existing Town of East Hampton roadways are intersected by the LIRR ROW.

Open trenching is the preferred method of installation for the SFEC-Onshore, except for areas designated for HDD. In areas where grading and the excavation of previously disturbed soils is required, existing drainage patterns will be maintained. Temporary erosion control measures (e.g. hay bale and/or silt fence barriers and the protection of soil stockpiles), as outlined in the Project EM&CP and the SWPPP, will be used. Additionally, BMPs will be utilized to stabilize areas where more moderate slopes are encountered. Following the installation of the SFEC-Onshore along road ROWs, disturbed areas of more moderate slopes will be restored to pre-construction conditions and, as such, the existing topography along the road ROWs will be maintained.

The SFEC-Interconnection Facility will be located on undeveloped land adjacent to the existing East Hampton Substation. As shown on Figure 4.5-1, existing topography within this area is relatively flat. The construction of the SFEC-Interconnection Facility will include general site preparation and excavation for the installation of the underground SFEC-Onshore duct bank, as well as for the installation of all aboveground structures including transformers, switchgears, and cable systems. As part of the construction of the SFEC-Interconnection Facility, temporary erosion control measures, as outlined in the Project EM&CP and the SWPPP, will be used. No significant impacts are anticipated to existing topography as a result of the construction of the SFEC-Interconnection Facility.

Geology

As indicated in Section 4.5.1.2, *Geology*, depth to bedrock in the vicinity of the SFEC-Onshore ranges from approximately 1,400 feet (427 m) bgs at the sea-to-shore transition corridor to approximately 1,300 feet (396 m) bgs at the SFEC-Onshore corridor's intersection with the LIRR ROW. There are no bedrock outcrops within 500 feet (152 m) of the Project corridor and, as such, bedrock blasting is not anticipated. The installation of the SFEC-Onshore, whether utilizing open trenching techniques or HDD, as well as excavation activities associated with the SFEC-Interconnection Facility, will not encounter bedrock. As such, construction of the SFEC-Onshore, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility will have no significant impact on geology.

Soils

The SFEC-Onshore will be installed within existing pavement of public road ROWs and along the LIRR ROW, where practicable. The clearing of previously disturbed soils within the SFEC-Onshore corridor will be limited to areas of trenching along the Project corridor. In areas where HDD, as well as associated temporary work areas, will be utilized, the Project EM&CP will establish procedures for minimizing impacts associated with disturbed soils. Prior to the start of construction activities, temporary erosion control measures, outlined in the Project EM&CP and SWPPP, (e.g. hay bale and/or silt fence barriers and the protection of soil stockpiles) will be utilized to reduce the risk of soil erosion, fugitive dust from exposed soils, and siltation. Following the installation of the Project, 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. If any contaminated soils are discovered during Project excavation, steps will be taken to minimize further contamination, which will be detailed in the Project EM&CP and the Construction Contingency Plan.

Construction activities associated with the installation of the SFEC-Interconnection Facility will include general site preparation and excavation for the installation of the underground and aboveground structures. Temporary erosion control measures outlined in the Project SWPPP and EM&CP will be utilized during construction of the SFEC-Interconnection Facility to reduce the risk of soil erosion, fugitive dust from exposed soils, and siltation. Permanent stormwater management measures will be required for the SFEC-Interconnection Facility, due to the increase in impervious area and increase in stormwater runoff. The permanent stormwater management measures will be described in the Project EM&CP.

In summary, no significant impacts are anticipated on soils as a result of construction of the Project.

Groundwater

Based on depth to groundwater along the Project, as described in Section 4.5.1.4, *Groundwater*, dewatering will likely be required in some areas to control surface and subsurface water to allow the Applicant to perform necessary construction activities. Any dewatering that is required in excavated and/or trenched areas will be properly managed by appropriate control measures. As noted above, a SWPPP will be prepared for the Project as part of the Project EM&CP, and the Applicant will ensure that the appropriate dewatering measures will be implemented during construction.

An impact assessment of the HDD installation within the sea-to-shore transition corridor on groundwater resources was conducted by GZA GeoEnvironmental, Inc. in March 2018 (GZA). GZA research determined that public water and sewer services are not available within the vicinity of the sea-to-shore transition corridor. Therefore, "nearby residences relay on private drinking water wells and septic systems. No public records of private water-supply wells were available; however, according to municipal regulations, the minimum well depth required is 50 feet (15 m) and the top of the well screen must be at least ten to 40 feet (12 m) below the water table, depending on the location of the well, and constructed with steel or plastic casing. Based on the shallow groundwater table... GZA anticipates that private water-supply wells in the... area are likely a minimum of 50 feet [15 m] deep but are more likely much deeper than that to avoid any impacts from the on-site septic systems" (GZA, 2018). Therefore, the potential for the HDD to impact nearby water-supply wells or the aquifer is anticipated to be small, due to the depth of the HDD for the sea-to-shore transition, and therefore, minor to no impacts to groundwater are anticipated.

4.5.2.2 Potential Operational Impacts and Mitigation

Potential operational impacts associated with the Project will be short-term and negligible with respect to topography, geology, soils, and groundwater. The Project is anticipated to have no maintenance needs unless a fault or failure occurs due to damage from outside influences. If a repair is needed, potential impacts are anticipated to be similar to construction, but at a smaller scale. Similar mitigation techniques will be utilized during maintenance activities that are anticipated to be used during Project construction.

4.6 Terrestrial Vegetation and Wildlife

This section evaluates observed and expected terrestrial vegetation and wildlife along the Project, specifically terrestrial vegetation and wildlife which are not listed as RTE (see Section 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*).

The information presented in this section is based on existing published data, government agency correspondence, and onshore field surveys conducted for the Project between May and November of 2017 (see Appendix A). The potential impacts to terrestrial vegetation and wildlife that may result from the construction and operation of the Project, along with proposed methods to avoid, minimize, and mitigate for any potential impacts, are also described below.

Aquatic vegetation is discussed within Section 4.10, *Benthic and Shellfish Resources* and the associated Appendix J – Pre-Construction Sediment Profile and Plan View Imaging Benthic Assessment Report. Additionally, finfish and benthic and shellfish resources are discussed in Section 4.9, *Finfish* and Section 4.10, *Benthic and Shellfish Resources,* respectively.

4.6.1 Existing Terrestrial Vegetation and Wildlife Conditions

This section discusses existing terrestrial vegetation and wildlife conditions based on desktop research, agency correspondence, and field surveys.

4.6.1.1 Terrestrial Vegetation

This section describes the existing terrestrial vegetation within the Project area based on review of published land cover data, field surveys of ecological community types, and vegetation inventories compiled during field surveys.

The SFEC-Onshore corridor is comprised primarily of unvegetated road surfaces and railroad beds, as well as various other vegetated and unvegetated cover types that occur within the corridor, as described below. As observed in the field, these cover types exhibit varying degrees of disturbance associated with vehicular traffic and road/railroad maintenance practices (e.g.

grading, mowing, grubbing, pruning, herbicide applications, etc.), as well as residential/commercial development. The sea-to-shore transition is primarily unvegetated roadway, while the SFEC-Interconnection Facility site is comprised entirely of forested and successional habitat.

Characterization of vegetative communities and other cover types within the SFEC-Onshore corridor occurred through review of the USGS National Land Cover Database (NLCD) (Homer, et al., 2015), which was compiled based on analysis of satellite imagery data. The various NLCD land cover categories provide a general representation of the vegetation and land uses located within SFEC-Onshore corridor, at the sea-to-shore transition and at SFEC-Interconnection Facility, as shown on Figure 4.6-1 – National Land Cover Database.

Based on the NLCD data, six developed (61 percent) and forested (16 percent) cover types account for the vast majority (77 percent) of land cover within the SFEC-Onshore corridor and the sea-to-shore transition corridor. The remaining 23 percent is comprised of several other cover types, including agricultural land, successional communities, wetlands/water, and barren (unvegetated) land (see Table 4.6-1 National Land Cover Database Cover Types, below). The Beach Lane landing site is comprised of 91 percent developed land cover types, with the remainder occupied by Pasture/Hay. The SFEC-Interconnection Facility is comprised of entirely the Deciduous Forest cover type.

Table 4.6-1 National Land Cover Database Cover Types [a]

Land Cover Type	SFEC-Onshore Corridor and the Sea-to-Shore Transition Corridor (acres [ha]/percentage)	SFEC-Interconnection Facility (acres [ha]/percentage)
Developed - Open Space	5.89 (2.38)/26.02	-
Evergreen Forest	2.77 (1.12)/12.24	-
Deciduous Forest	0.88 (0.36)/3.89	2.38 (0.96)/100
Developed - Low Intensity	5.97 (2.42)/26.37	-
Developed - Medium Intensity	1.67 (0.68)/7.38	-
Pasture/Hay	0.43 (0.17)/1.90	-
Barren Land (Rock/Sand/Clay)	1.14 (0.46)/5.04	-

Land Cover Type	SFEC-Onshore Corridor and the Sea-to-Shore Transition Corridor (acres [ha]/percentage)	SFEC-Interconnection Facility (acres [ha]/percentage)
Developed - High Intensity	0.29 (0.12)/1.28	-
Shrub/Scrub	0.91 (0.37)/4.02	-
Woody Wetlands	0.13 (0.05)/0.57	-
Emergent Herbaceous Wetlands	0.07 (0.03)/0.31	-
Open Water	2.49 (1.01)/11.00	-
Total	**22.64 (9.16)/100.02**	**2.38 (0.96)/100**

[a] Due to rounding, some of the column totals do not sum to 100 percent.

Qualitative refinement of land cover types for the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility occurred through field identification of various community types described in the NYNHP publication *Ecological Communities of New York State* (ECNYS) (Edinger, et al., 2014). This guidance provides detailed descriptions and global and state rarity rankings for various ecological communities that occur within New York State. Utilizing the ECNYS community descriptions, qualitative observations of various ecological community types occurred during the field surveys.

The SFEC-Onshore corridor is primarily comprised of unvegetated habitats that are representative of the ECNYS Paved Road/Path and Railroad communities. As observed during field surveys, both communities are developed and essentially unvegetated land uses that are classified by the NYNHP as 'unranked cultural' communities (i.e. artificial communities that have been created or significantly altered by humans) with distributions throughout New York State. Other unranked cultural communities associated with suburban, commercial, and agricultural land uses are prevalent within the SFEC-Onshore corridor, including Mowed Roadside/Pathway, Mowed Lawn, Brushy Cleared Land, Unpaved Road/Path, and Mowed Lawn with Trees. Non-cultural ECNYS vegetated community types observed within the SFEC-Onshore corridor include early successional communities (i.e. Successional Old Field and Successional Shrubland), as well as edge habitats associated with the Successional Southern Hardwoods, Pitch Pine-Oak Forest, Coastal Oak-Heath Forest and other woodland communities that occur along the perimeter of the corridor.

The Beach Lane landing site includes Paved Road/Path, Marine Beach, and Marine Intertidal Gravel/Sand Beach communities that occur at and beyond the southern terminus of Beach Lane to the shoreline.

The site of the SFEC-Interconnection Facility is currently undeveloped and vegetated with disturbed examples of the Coastal Oak-Hickory Forest and Successional Shrubland communities. As observed in the field, both communities exhibit evidence of historical grading and other ground disturbance, and the understory and groundcover strata is dominated by a number of non-native/invasive plant species. The adjacent existing East Hampton Substation is comprised primarily of unvegetated cultural communities (i.e. Urban Structure Exterior and Paved Road/Path), with vegetated successional communities in perimeter areas (i.e. Successional Shrubland).

4.6.1.2 Terrestrial Wildlife

This section describes observed and expected terrestrial wildlife species within the vicinity of the Project. Observed birds, mammals, and herpetofauna (amphibians and reptiles) were identified during field surveys of the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility. Expected terrestrial wildlife species inventories were developed based on published data and assessment of the ecological communities observed along the onshore Project corridors as described in Section 4.6.1.1, *Terrestrial Vegetation*. RTE terrestrial wildlife are also discussed within Section 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*.

The roads and railroad beds that comprise the majority of the SFEC-Onshore corridor represent a limiting factor for most wildlife, due to paved and/or unvegetated conditions, vehicular traffic, and associated human activity. Accordingly, these artificial structures do not function as significant habitat areas for wildlife. The roads and railroad beds also represent physical barriers to travel/migration for a number of terrestrial species. Vegetated or otherwise undeveloped portions of the SFEC-Onshore, and SFEC-Interconnection Facility have greater habitat value for the observed and expected wildlife species described in this section. These include the woodland edges, successional communities, agricultural fields, and landscaped habitats of the SFEC-Onshore corridor, the woodland and successional communities at the SFEC-Interconnection Facility, and the shoreline terrestrial communities of the sea-to-shore transition corridor.

An inventory of the terrestrial wildlife species observed along the onshore Project corridors during the field surveys is provided in Appendix A.

Birds were the most commonly observed form of wildlife along the onshore portion of the Project. The ecological community types identified during the field surveys represent potential habitat for a variety of birds, including species commonly associated with developed areas, agricultural fields, successional habitats, woodland communities, and marine shorelines. Various avian species were observed (i.e. seen or heard) within or proximate to the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility during the field surveys. Other avian species that may occur in the vicinity were identified through review of the New York State Breeding Bird Atlas (NYSBBA) (McGowan and Corwin, 2008). According to this resource, a total of 80 bird species were identified between 2000 and 2005 within the two NYSBBA survey blocks that the SFEC-Onshore corridor, the sea-to-shore transition corridor, and the SFEC-Interconnection Facility are located in (Blocks 7253B and 7253D, see Appendix A).

Six common mammals were observed within the vicinity of the Project during field surveys: Eastern Chipmunk (*Tamias striatus*), Eastern Cottontail (*Sylvilagus floridanus*), Eastern Gray Squirrel (*Sciurus carolinensis*), Raccoon (Procyon lotor), Whitetail Deer (*Odocoileus virginianus*) and Woodchuck (*Marmota monax*). Other mammal species expected within or proximate to the Project were identified through review of existing surveys of Long Island mammalian populations, including *The Mammals of Long Island, New York* (Connor, 1971) and the *Final Small Mammal and Herpetile Field Sampling and Summary Report for the South Shore of Long Island, New York* (USACE, 2002). Based on these resources and the ecological communities identified during the field surveys, an inventory was prepared of additional mammals that may occur onshore in the vicinity of the Project (see Appendix A).

The lack of freshwater wetlands and surface waters located onshore within or proximate to the Project is a limiting factor for herpetofauna species that require aquatic habitats for all or portions of their life cycles. The successional and woodland habitats of the SFEC-Onshore corridor and the SFEC-Interconnection Facility provide potential habitat for herpetofauna adapted to dry, upland habitats, including Eastern Garter Snake (*Thamnophis sirtalis*), Eastern Milk Snake (*Lampropeltis triangulum*), Eastern Hognose Snake (*Heterodon platirhinos*), Eastern

Box Turtle (*Terrapene carolina*), Gray Treefrog (*Hyla versicolor*), and the Northern Black Racer (*Coluber c. constrictor*). The Northern Black Racer was observed within wooded portions of the SFEC-Onshore corridor during the field surveys. The herpetofauna species reported within the USGS East Hampton, New York Quadrangle, within which the Project is located, were identified through review of the 1990–1999 New York State Amphibian and Reptile Atlas Project database (NYSDEC, 2018a) (see Appendix A). Given the habitat limitations described above, it is expected that not all of the species included in the database list occur within the vicinity of the Project.

4.6.2 Invasive Species

Invasive species are defined in 6 NYCRR Part 575 (Prohibited and Regulated Invasive Species) (NYSDEC, 2014) as:

"*…nonnative to a particular ecosystem, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can harm natural communities and systems (plants and animals found in particular physical environments) by out-competing native species, reducing biological diversity, altering community structure and, in some cases, changing ecosystems.*"

Pursuant to 6 NYCRRR Part 575, the possession, transport, importation, sale, purchase, and introduction of select invasive species is prohibited or regulated in New York State.

Twenty-nine invasive species occurrences were identified onshore within or proximate to the Project and located with a global positioning system (GPS) device during field surveys (see Wetland and Habitat Resource Maps in Appendix A). The 29 occurrences include one or more of the 18 invasive species identified on Table 4.6-2 – Observed Terrestrial Invasive Species. Twenty-eight of the occurrences are for invasive plants, while the one remaining occurrence is for observed evidence of a Southern Pine Beetle (*Dendroctonus frontalis*) infestation within dead and dying Pitch Pine (*Pinus rigida*) trees located within and adjacent to the LIRR ROW portion of the SFEC-Onshore corridor, in the vicinity of Stephen Hands Path.

Table 4.6-2 Observed Terrestrial Invasive Species

Scientific Name	Common Name
Celastrus orbiculatus	Asiatic Bittersweet
Elaeagnus umbellata	Autumn Olive
Ligustrum obtusifolium	Border Pivet
Alliaria petiolata	Garlic Mustard
Hedera helix	English Ivy
Berberis thunbergii	Japanese Barberry
Lonicera japonica	Japanese Honeysuckle
Polygonum cuspidatum	Japanese Knotweed
Persicaria perfoliata	Mile-a-minute
Rosa multiflora	Multiflora Rose
Artemesia vulgaris	Mugwort
Acer plantanoides	Norway Maple
Ampelopsis brevipedunculata	Porcelain Berry
Dendroctonus frontalis	Southern Pine Beetle
Acer pseudoplatanus	Sycamore Maple
Lonicera tatarica	Tatarian Honeysuckle
Ailanthus altissima	Tree-of-heaven
Rubus phoenicolasius	Wineberry

Aquatic invasive species along or within the vicinity of the SFEC-NYS corridor were not surveyed for during offshore field studies. Measures for the management of aquatic invasive species are included in Appendix O – Preliminary Invasive Species Control Plan.

4.6.3 Potential Terrestrial Vegetation and Wildlife Impacts and Proposed Mitigation

This section examines the potential impacts to the terrestrial vegetation and wildlife anticipated as a result of the construction, operation, and maintenance of the Project and identifies measures to avoid or mitigate these impacts. Potential impacts are anticipated to be negligible to minor.

4.6.3.1 Potential Construction Impacts and Mitigation

This section describes the potential construction impacts to terrestrial vegetation and wildlife that may result from the construction of the Project, along with the methods that the Applicant will implement to avoid, minimize, and mitigate for impacts. Construction-related impacts to terrestrial vegetation and wildlife are anticipated to be minor and short-term, as described below.

Impacts to terrestrial ecological communities and vegetation within the sea-to-shore transition corridor will be avoided due to the utilization of HDD technology. This construction method will eliminate the need for surficial ground disturbance and vegetative clearing within shoreline communities that would otherwise occur with traditional cable burial methods.

Impacts to vegetation within road ROWs of the SFEC-Onshore corridor will be avoided or minimized, since cable installation will occur within existing paved portions of the road ROWs, where practicable. As a result, ground disturbance associated with cable burial will be limited primarily to the unvegetated and impervious surfaces of the Paved Road/Path ecological community, thereby avoiding the need to disturb or remove vegetation. Adequate workspace to accommodate an open-trench of up to four feet wide by eight feet (1 m wide by 2 m wide) deep and HDD operations (including material and equipment staging), exists within the paved roads and the adjacent road shoulders. Some clearing, grubbing and/or trimming of vegetation within the Mowed Roadside/Pathway and other maintained cultural communities that comprise the road shoulders may be necessary during construction. Any such activities will be short-term, minor, and confined to the Project corridor and the limits of the construction workspace will be further detailed within the Project EM&CP. The construction workspace will be kept to the minimum width necessary to accommodate space for safe equipment passage, materials staging, open trenching, HDD operations, and other activities associated with the SFEC-Onshore installation.

Cable burial within the LIRR ROW portion of the SFEC-Onshore corridor will occur within unvegetated areas, to the largest extent possible, to avoid impacts to vegetated communities. Where not possible, clearing, grubbing, and/or trimming may occur within the vegetated communities along the LIRR ROW. Vegetation impacts will be limited to the minimum necessary to accommodate open trenching and other work activities.

Clearing of Coastal Oak-Hickory Forest and Successional Shrubland communities will occur to construct the SFEC-Interconnection Facility. Vegetation impacts will be limited to the minimum necessary to accommodate open trenching and other work activities.

Revegetation and restoration of disturbed areas within the SFEC-Onshore corridor will be carried out for areas along the road ROWs where vegetation has been disturbed. Where permanent restoration is not immediately possible along road ROWs (e.g. due to winter weather conditions), the disturbed areas will be temporarily stabilized until permanent restoration can occur. Further details describing stabilization and restoration measures will be discussed within the Project EM&CP and SWPPP. No application of pesticides or herbicides is proposed during construction.

The SFEC-Onshore corridor is comprised primarily of the unvegetated road surfaces and railroad beds, which represent a limiting factor for most wildlife due to paved and/or unvegetated conditions, vehicular traffic, and limited habitat for foraging and nesting. Accordingly, these artificial structures do not function as significant habitat areas for wildlife and also represent physical barriers to travel/migration for a number of terrestrial species. The wildlife habitat value of the adjacent vegetated and unvegetated ecological communities within the SFEC-Onshore corridor has been impaired due to the road/railroad maintenance practices, as well as residential/commercial development and associated human activity.

Work within the road ROWs of the SFEC-Onshore corridor will be confined largely to paved surfaces and the adjacent road shoulders. As such, potential impacts to the limited wildlife fauna of these areas are expected to be minor and short-term, due to noise and activity associated with construction.

Clearing, grubbing, and/or trimming of vegetation within the vegetated communities of the LIRR ROW will result in a minor reduction of available foraging and breeding habitat for local wildlife. The overall impacts to wildlife populations are expected to be minor and limited to common species adapted to the disturbed conditions that occur at this location due to the adjacent LIRR.

Construction of the SFEC-Interconnection Facility will result in a minor reduction of available foraging and breeding habitat for local wildlife. The overall impacts to wildlife populations are expected to be minor and limited to common species adapted to the disturbed conditions that occur at this location due to the adjacent existing East Hampton Substation. HDD will be utilized within the sea-to-shore transition corridor to avoid/minimize impacts to shoreline wildlife habitats and resident wildlife.

4.6.3.2 Potential Operational Impacts and Mitigation

Operational impacts on terrestrial vegetation and wildlife are anticipated to be negligible. Following the completion of work, disturbed areas within the SFEC-Onshore corridor will be restored and revegetated to pre-work conditions or similar, with the exception of a path approximately 10 feet (3 m) wide above the cable duct bank along the LIRR ROW which will need to remain clear for access and maintenance purposes. There will be no aboveground cable or structures within the SFEC-Onshore or SFEC-NYS corridors, and operation of the Project will have negligible impacts on terrestrial vegetation and wildlife in these areas. The SFEC-Interconnection Facility will be designed to be free of intrusive vegetation that could affect the operation of the facility, and open areas will be paved or graveled. Periodic maintenance (e.g. trimming, grubbing) will be necessary to maintain unvegetated conditions within the facility. Herbicides may be used during operations of the Project along the LIRR ROW and at the SFEC-Interconnection Facility, consistent with the LIRR and LIPA herbicide application practices. Volumes and manner of use will be detailed within the Project EM&CP. No pesticides are proposed to be used during operations of the Project.

4.6.3.3 Potential Invasive Species Impacts and Mitigation

Invasive species have the potential to out-compete native species, reduce biological diversity, degrade wildlife habitat, and alter community structure. To minimize the potential for further spread of aquatic or terrestrial invasive species, within or proximate to the Project, and to limit the introduction of new invasive species occurrences, a preliminary invasive species prevention and management plan has been developed (see Appendix O) and will be further detailed in the Project EM&CP.

4.7 Wetlands and Waterbodies

This section describes wetlands and waterbodies identified within or proximate to the Project, including tidal and freshwater wetlands and surface waters. It also provides an overview of the federal and state regulations pertaining to wetlands and waterbodies. Further, this section describes the potential impacts to wetlands and waterbodies 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. The information presented in this section is based on review of published information, government agency maps, and field surveys conducted between May and November of 2017 for the Project (see Appendix A for additional details).

4.7.1 Existing Wetlands and Waterbodies Conditions

Wetland resources located in the vicinity of the SFEC include USFWS NWI and NYSDEC freshwater and tidal wetlands and adjacent areas. Wetland delineations and results are presented in Appendix A.

As shown on Figure 4.7-1 – NWI Wetlands, there are no NWI wetlands located within 500 feet (152 m) of the SFEC-Onshore corridor or at the SFEC-Interconnection Facility. According to NWI wetland mapping available for the Project, three NWI wetlands associated with the Atlantic Ocean are crossed by the SFEC-NYS corridor. Table 4.7-1 – USFWS NWI Wetlands and Waterbodies Crossed by the SFEC-NYS below indicates the NWI wetlands/waterbodies crossed by the SFEC-NYS.

Table 4.7-1 USFWS NWI Wetlands and Waterbodies Crossed by the SFEC-NYS

USFWS Classification Code/Cowardin Class	Wetland Type	USFWS NWI Wetland Crossed by the Centerline (Linear feet)
M1UBL	Estuarine and Marine Deepwater	18,546 (5,653 m)
M2US2N	Estuarine and Marine Wetland	49 (15 m)
M2US2P	Estuarine and Marine Wetland	81 (25 m)

The NYSDEC uses specific categories and codes to describe different types of tidal wetlands. These include the Littoral Zone (LZ) tidal wetland category, which is defined by the NYSDEC as "The tidal wetland zone that includes all lands under tidal waters which are not included in any other category. There shall be no LZ under waters deeper than six feet at mean low water" (NYSDEC, 2018b)

According to NYSDEC tidal wetland map data, a LZ tidal wetland is crossed by the sea-to-shore transition corridor. No other mapped NYSDEC tidal wetlands occur at or within 300 feet (91 m) of the Project (see Figure 4.7-2 - NYSDEC Wetlands). Table 4.7-2 – NYSDEC Wetlands and Waterbodies Crossed by the SFEC-NYS below indicates the NYSDEC wetlands/waterbodies crossed by the SFEC-NYS.

Table 4.7-2 NYSDEC Wetlands and Waterbodies Crossed by the SFEC-NYS

Wetland/Waterbody ID	Cowardin Class	NYSDEC Wetland Crossed by the Centerline (Linear feet)
2020	LZ	7,408 (2,258 m)

This tidal wetland boundary of the SFEC-NYS was delineated on August 3, 2017 and is located within the sea-to-shore transition corridor. Numbered flags were placed along the mean high water line (MHWL) of the unvegetated beach, as determined through field surveys of wrack lines, water marks and topography. The flags were documented in the field with a GPS instrument (see Appendix A).

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. Specifically, pursuant to 6 NYCRR Part 663.5(e), the degree of benefits and the standards for permit issuance for regulated activities within or adjacent to Class I wetlands is described as follows:

"*Class I wetlands provide the most critical of the State's wetland benefits, reduction of which is acceptable only in the most unusual circumstances. A permit shall be issued only if it is determined that the proposed activity satisfies a compelling economic or social need that clearly and substantially outweighs the loss of or detriment to the benefit(s) of the Class I wetland*."

According to NYSDEC freshwater wetland map data, NYSDEC Freshwater Wetland EH-25 is located approximately 400 feet (122 m) to the east of the SFEC-Onshore corridor, beyond the adjoining residential properties and woodlands that adjoin Wainscott Stone Road (Figure 4.7-2). The wetland is associated with Georgica Pond. According to the NYSDEC, Freshwater Wetland EH-25 is ranked as a Class I wetland. No other mapped NYSDEC freshwater wetlands occur at or within 500 feet (152 m) of the SFEC-Onshore.

Based on field surveys and the government agency map review, no other tidal or freshwater wetlands occur within or adjacent to the Project. As such, no other wetlands were delineated. Additionally, no streams were identified during field surveys and no mapped NYSDEC regulated streams are crossed by the Project.

4.7.2 Potential Wetlands and Waterbodies 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.

Impacts to intertidal wetlands will be avoided, since this portion will be crossed using HDD technology. This construction method will eliminate the need for surficial ground disturbance within shoreline communities and adjacent areas that will otherwise occur with traditional cable burial methods. During the HDD, there is the potential for drilling fluids to migrate to the surface of the sediments, and be released into the water column, which is known as a frac-out. A Construction Contingency Plan will be developed within the Project EM&CP, which will describe procedures to contain and clean-up a frac-out.

Temporary disturbance within subtidal waters will occur at the seaward end of the sea-to-shore transition corridor during HDD operations. The disturbance will be localized and minor in nature, due primarily to short-term bottom disturbance and increased water column turbidity, as discussed in Section 4.8, *Marine Physical and Chemical Characteristics*. No permanent impacts or loss of wetlands or waters of the United States will occur.

As indicated in Section 4.7.1, *Existing Wetlands and Waterbodies Conditions*, NYSDEC Freshwater Wetland EH-25 is located approximately 400 feet (122 m) to the east of the SFEC-Onshore, beyond residential properties and woodlands that adjoin Wainscott Stone Road. Given the distance from the SFEC-Onshore, no construction or operational impacts to this wetland are expected, and the Project is located well beyond the respective USACE and New York State wetland jurisdictions.

Based on the government agency map review and wetland delineations, no other tidal or freshwater wetlands occur within or adjacent to the Project. As such, no other potential wetland impacts are expected.

4.8 Marine Physical and Chemical Characteristics

This section describes the marine physical and chemical characteristics of the North Atlantic Ocean along the SFEC-NYS. The results of various marine geophysical and geotechnical (G&G)

studies conducted along the SFEC-NYS corridor in 2017, along with previously completed published studies within the Project area, are described in the sections below.

4.8.1 Existing Marine Physical and Chemical Characteristics Conditions

This section describes the existing marine physical and chemical characteristics within the Project area.

4.8.1.1 Physical Characteristics

Bathymetry

The SFEC-NYS is located entirely within the North Atlantic Ocean. Water depths along the SFEC-NYS corridor range from approximately zero to 82 feet (0 to 25 m) within New York State territorial waters. The water depths are referenced as the mean lower low water datum.

Tides and Currents

Along the SFEC-NYS, semi-diurnal (i.e. twice daily) tides come in from the southeast, with an estimated average tidal range of 3.2 feet (1.0 m). This results in approximately two high tides and two low tides daily. The closest NOAA tide station near the SFEC-NYS is on the north shore of Long Island in Montauk, New York (Station No: 8510560). The Montauk NOAA tide station indicated a mean diurnal range of 2.53 feet (0.77 m).

Circulation patterns are influenced by winds, tides, differences in water density (dependent on temperature and salinity), and geomorphology (bathymetry and land masses). Regionally, currents from the Rhode Island Sound meet outflow from Block Island Sound off Montauk Point and flow towards the southwest below Long Island. Although current flow south of Long Island follows the overall southwestern movement, nearshore currents flow towards the east. Statistics were generated for a preliminary assessment of ocean currents along the SFEC-NYS corridor utilizing hindcast reanalysis of inputs from the Hybrid Coordinate Ocean Model 1/12-degree global simulation assimilated with Navy Coupled Ocean Data Assimilation from the United States Naval Research Laboratory (Halliwell, 2004). Currents moving along the southern Long Island shoreline near the SFEC-NYS had an average velocity of up to 9.8 in per second (24.9 cm per second).

Sediment Transport

Sediments along the SFEC-NYS are majorly comprised of coarse sands (>130 microns) and fine sands (75-130 microns). Sediments are transported along the SFEC-NYS generally in a northeast/southwest direction, reflecting the tidal current patterns, which are aligned with the nearshore topography.

Water Temperature

In general, heating of water and increased salinity during the late summer and early fall results in a stratified water column that is subjected to mixing in the fall from upwelling bottom waters and storm action. Surface water temperatures fluctuate up to 59 degrees Fahrenheit (◦F) seasonally, and as expected, bottom waters have smaller seasonal temperature fluctuation of approximately 41 ◦F. Water temperatures are highest in July/August when the water column becomes stratified; surface water temperatures are close to 68 ◦F, with bottom waters along the SFEC-NYS of about 50 ◦F. During the winter, average surface water temperatures range from approximately 39 to 41 ◦F, with bottom waters staying slightly warmer. Water temperatures closer to the shoreline may be several degrees warmer in the summer and several degrees colder in the winter than the averages described above.

4.8.1.2 Chemical Characteristics

Water Quality

The North Atlantic Ocean along the SFEC-NYS corridor, is a Class SA saline surface waterbody. Classification SA (marine waters) are waters with a best usage for shellfishing for market purposes, swimming and other recreation, and fishing. The portion of the Atlantic Ocean coastline along the SFEC-NYS corridor has no known environmental impacts, and all designated uses are fully supported. A fish consumption advisory exists because of possible elevated levels of polychlorinated biphenyls (PCBs) in fish tissue. However, the source of the PCBs is not local as there are no known sources of PCBs along coastline within the vicinity of the SFEC-NYS. Because of the migratory range of fish, PCB exposure likely occurred outside the Project area. Beach monitoring found that few beaches, if any, had elevated bacteriological levels and no beach closures have been reported because of bacterial pollution. The section of the Atlantic Ocean coastline along or within the vicinity of the SFEC-NYS is not listed in the 2016 New

York State Section 303(d) List of Impaired Waters Requiring a Total Maximum Daily Load /Other Strategy (NYSDEC, 2016a).

4.8.1.3 Marine Surveys and Analysis

The marine G&G and benthic studies for the SFEC-NYS were conducted in accordance with:

- Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information (30 CFR Part 585) prepared by the BOEM in July 2015;
- Guidelines for Providing Archaeological and Historic Property Information (30 CFR Part 585) prepared by the BOEM in July 2015 and March 2017;
- Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf prepared by the BOEM in November 2013; and
- Guidelines for Information Requirements for a Renewable Energy Construction and Operation Plan, Version 3.0, prepared by the BOEM in April 2016.

Site-specific surveys were conducted for the Project between July and December 2017. The purpose was to collect data to be used for general assessment of the conditions along the SFEC-NYS including determining:

- Shallow hazards;
- Geological conditions;
- Geotechnical characteristics;
- Data for marine archaeological assessments; and
- Data for benthic studies.

The results of the G&G and benthic survey work are summarized below and discussed in detail in a series of G&G and benthic reports included in Appendix G and Appendix J. Additional details on the conducted benthic surveys are also within Section 4.10, *Benthic and Shellfish Resources*.

Marine Geophysical Studies

The sediment profile and plan view imaging (SPI/PV) survey was conducted from November 11 to November 15, 2017 aboard the vessel *R/V Fugro Enterprise*. SPI/PV imagery is a proven technique to document baseline benthic conditions (physical and biological) as well as any pre-existing pollution or other environmental damage (Germano et al., 2011). This approach can accurately detect and document changes in sediment profiles due to alteration of sedimentary structures resulting from exploration, construction, and operation activities. Furthermore, the imagery is well-suited to inform constituents and stakeholders of baseline and post-construction/operation conditions using a photographic format. These capabilities allow the SPI/PV survey to provide fine-scale ground-truthing of G&G survey data.

Results of the SPI/PV survey concluded that the SFEC-NYS corridor contains seabed slopes that generally vary from less than one degree to three degrees.

Surficial sediments along the SFEC-NYS corridor were generally homogenous with types ranging from very fine sand to coarse sand. No boulders were observed along the SFEC-NYS corridor. Of the three locations surveyed along the SFEC-NYS corridor, one indicated irregular short period ripples as the predominant bedform, while the other two locations were too turbid to determine the bedform. Ripples indicate frequent and persistent hydrodynamic forcing at the surface of the seabed.

Marine Geotechnical Studies

Between October and December 2017, a geotechnical study was conducted along the SFEC-NYS to characterize the sediment conditions within the Project area. Geotechnical sampling and in situ testing was conducted using shallow seabed cone penetration tests (CPT) and vibracoring. A Seascout 35 seabed CPT system was used for the cone penetration testing. The Seascout 35 is a compact unit that uses a coiled rod system capable of advancing cones to a depth of approximately 82 feet (25 m) in certain soil conditions. CPT data was used to estimate material density, strength, and soil behavior type. Vibracoring was completed using a self-contained High Performance Corer (HPC) that is launched from the A-frame of an exploration vessel. The HPC contains an electric motor and simple barrel design with a cutting shoe that holds a sample retainer and an 3.5 inch (8.9 cm) diameter clear plastic single-use liner for sample retention. The 9.8 feet (3.0 m) barrel was used to obtain the environmental, cultural, and geotechnical cores along the SFEC-NYS corridor.

The vibracores provided physical samples that were tested in the laboratory to determine particle size distribution, Atterberg Limit properties (i.e. plasticity), thermal conductivity, and specific gravity. Each vibracoring sampling location was also tested for:

- Arsenic (6010C)
- Cadmium (6010C)
- Copper (6010C)
- Lead (6010C)
- Mercury (7471B)
- Benzene (8260C)
- Total BTEX (8260C)
- Total PAH
- Sum of DDT+DDE+DDD (8081B_LL)
- Mirex (8081B_LL)
- Chlordane (8081B_LL)
- Dieldrin (8081B_LL)
- PCBs (sum of aroclors) (8082A)
- Dioxin (Toxic Equivalency Total) (1613B)
- Grain Size
- Total Organic Carbon

The sediment chemistry analytical results were compared against the Sediment Quality Thresholds for in-water/riparian placement in the *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999). Based on the concentration of contaminants identified during the chemical analysis, sediment was classified as either Class A, B, or C, which are defined below:

- Class A - No Appreciable Contamination (No Toxicity to aquatic life). - If sediment chemistry is found to be at or below the chemical concentrations, which define this class, dredging and in-water or riparian placement, at approved locations, can generally proceed.
- Class B - Moderate Contamination (Chronic Toxicity to aquatic life). Dredging and riparian placement may be conducted with several restrictions. These restrictions may be

applied based upon site-specific concerns and knowledge coupled with sediment evaluation.

- Class C - High Contamination (Acute Toxicity to aquatic life). Class C dredged material is expected to be acutely toxic to aquatic biota and therefore, dredging and disposal requirements may be stringent.

The results of chemical analysis of the sediments collected along the SFEC-NYS concluded that the sediments correspond to Class A – No Appreciable Contamination.

Sediment Suspension and Deposition

Installation of the SFEC-NYS using a mechanical/hydro-jet plow, positioning of vessel anchors, and sediment disturbance during installation of the temporary cofferdam will result in short-term and localized suspension of sediment in the water column. The magnitude of these impacts depends on the sediment grain size, the volume and rate of sediment suspended, and the currents transporting the sediment. For mechanical/hydro-jet plow activity and excavation in the temporary cofferdam, a sediment transport study was completed that estimated the suspended solids concentrations, sediment transport, and resulting sediment deposition that may result from mechanical/hydro-jet plow installation of the cable and temporary cofferdam construction (see Appendix H-Hydrodynamic and Sediment Transport Modeling Results).

A modeling simulation was conducted along the SFEC-NYS which indicated that the maximum modeled total suspended solid (TSS) concentration from SFEC-NYS installation is 578 milligrams per liter (mg/L). Water column concentrations of 100 mg/L or greater are predicted to extend up to 394 feet (120 m) horizontally from the mechanical/hydro-jet plow and TSS concentrations are predicted to return to ambient levels (less than 10 mg/L) in 1.3 hours after the conclusion of mechanical/hydro-jet plow trenching. Modeling also indicates that elevated TSS concentrations are expected to remain very close to the seabed and that plumes are not predicted to extend vertically beyond three to nine feet (1 to 3 m) of the mechanical/hydro-jet plow at any time during the simulation.

A modeling simulation of suction dredging and side-casting at the HDD exit point for the sea-to-shore was also conducted. The maximum predicted TSS concentration from suction dredging at the HDD site is 562 mg/L. Water column concentrations of 100 mg/L are predicted to extend up to 476 feet (145 m) horizontally from the source and TSS concentrations are predicted to return to ambient levels (less than 10 mg/L) in 1.1 hours after the conclusion of suction dredging.

4.8.2 Potential Marine Physical and Chemical Characteristics Impacts and Proposed Mitigation

This section examines the potential impacts to the marine physical and chemical environment anticipated as a result of the construction and operation of the SFEC-NYS and identifies measures to avoid or mitigate these impacts. Potential impacts are anticipated to be negligible to minor.

4.8.2.1 Potential Construction Impacts and Mitigation

This section provides a description of the potential impacts to marine physical and chemical characteristics caused by the installation of the SFEC-NYS. Installation of the SFEC-NYS will not result in any effects on tide and current conditions in the vicinity of the Project because the SFEC-NYS will be installed below the seabed. Mechanical/hydro-jet plow, HDD, and the potential installation of the temporary cofferdam may have a minor impact to the physical and chemical conditions in the vicinity of the Project; however, the duration and extent of these activities and their effects will be short-term and localized. Potential impacts to marine physical and chemical characteristics along the SFEC-NYS could occur from seabed disturbance, sediment suspension/deposition, and accidental spills.

Seabed Disturbance

Impacts to water quality, bathymetric features, and sediment quality resulting from the construction of the SFEC-NYS (including HDD and cofferdam installation) will be short-term and minor and will result from temporary and localized increases in turbidity from sediment disturbance associated with cofferdam pile-driving and installation of the SFEC-NYS. Sediments disturbed by construction activities to install the SFEC-NYS are not expected to contain contaminants because the substrate is predominantly sand, which generally does not retain contaminants. Additionally, the results of the sediment sampling indicated that the sediments along the SFEC-NYS have no appreciable contamination (Class A).

A high density polyethylene (HDPE) conduit will be installed for the sea-to-shore transition using HDD. A temporary cofferdam may be installed approximately 1,750 feet (533 m) from the

MHWL at the HDD exit point from the seabed. The SFEC-NYS will be installed via HDD under the beach and intertidal water from the temporary cofferdam located offshore beyond the intertidal zone. A short-term impact to water quality from use of HDD methods to install the SFEC-NYS is possible, but will be minimized if a temporary cofferdam is utilized. The cofferdam will serve as containment for the drilling returns during the HDD installation and will also keep the excavation free of debris and from silting back in.

Once the HDPE conduit is installed the SFEC-NYS will be installed. The temporary cofferdam will be removed after installation of SFEC-NYS has started. The cofferdam walls will be removed, either by vibratory hammer (for a sheet pile cofferdam) or by lifting (for a gravity cell cofferdam). The excavated sediments placed in the immediate vicinity of the cofferdam will be allowed to disperse naturally. As a result, impacts to water and sediment quality and bathymetric features from seabed disturbance are expected to be negligible and short-term.

A drilling fluid of bentonite-water-based mud or another non-toxic drilling fluid will be utilized during HDD. Other BMPs, such as a water-filled temporary underwater dam, will be placed when there is potential for a release of bentonite. Because of the depth of the transition vault and the temporary cofferdam, it will be expected that bentonite slurry potentially released during construction will be contained and that fluid will sink to the bottom of the sea-to-shore transition, allowing for clean-up using a vacuum system. A Construction Contingency Plan for potential inadvertent releases of drilling fluids will be developed and included within the Project EM&CP to reduce the risk associated with a potential frac-out.

Sediment Suspension/Deposition

Quantitative modeling, as described in Section 4.8.1.3, *Marine Surveys and Analysis* and Appendix H, was completed to estimate the impacts of sediment disturbance and suspension in the water column on water and water resources resulting from installation of the SFEC-NYS cable and potential temporary cofferdam.

Most of the disturbed sediment will be expected to settle in the areas surrounding the SFEC-NYS shortly after installation. These localized impacts to marine water quality would be short-term and negligible and are not anticipated to affect dissolved oxygen, chlorophyll a, or nutrient balance in the region. In addition, based on Project-specific vibracore sampling results, the sediment in the SFEC-NYS is not expected to contain contaminants; therefore, water quality will be affected primarily by the short-term physical suspension of sediments.

Accidental Spills

During construction of the SFEC-NYS, various offshore vessels will be utilized, each containing various amounts of fuels, hydraulic fluid, oil, and other potentially hazardous materials that could be accidently released into the water. A Construction Contingency Plan will be developed and included within the Project EM&CP and utilized throughout the duration of the Project to prevent spills to the extent practicable and also detail proper spill clean-up procedures, limiting impacts to sediment and water quality in the Project area. Given the minimal volumes of hazardous materials that will be present during construction, any accidental discharges will be considered negligible.

4.8.2.2 Potential Operational Impacts and Mitigation

The SFEC-NYS is anticipated to have no maintenance needs unless a fault or failure occurs. Cable failures are only anticipated because of damage from outside influences, such as boat anchors. If non-routine maintenance is required, there could be seabed disturbance and sediment suspension/deposition causing short-term, negligible impacts to water quality, bathymetric features, and water resources. Accidental spills could occur during non-routine maintenance activities. In the event of a spill, the Construction Contingency Plan within the Project EM&CP will be followed. No cooling or insulating fluids will be utilized for the SFEC-NYS; therefore fluid leakage is not a risk to water quality or sediment.

Potential impacts from non-routine maintenance would be localized and short-term, and therefore, impacts to water quality, sediment, and water resources will be negligible.

4.9 Finfish

This section identifies and describes the finfish species potentially occurring in the coastal and marine waters crossed by the SFEC-NYS corridor and the potential impacts to these species (through all life stages from egg to adult) and their habitats during Project construction, operation, and maintenance. Additionally, techniques to minimize these potential impacts from the construction, operation, and maintenance of the Project are described. The following information is based on reviewing state and federal agency-published papers and databases, published journal articles, online data portals, mapping databases, and correspondence with resource agencies (NOAA, NYSDEC, etc.).

Further detail regarding RTE finfish is included in Section 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*.

Essential fish habitats (EFH) along or within the vicinity of the SFEC-NYS are described within important management areas and habitats in Section 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*.

4.9.1 Existing Finfish Conditions

Along and within the vicinity of the SFEC-NYS corridor, anticipated finfish include demersal and pelagic finfish assemblages. BOEM (2013) defines demersal (groundfish) as species that spend at least their adult life stage on or close to the ocean bottom. Demersal finfish are generally considered to be high-value fish and are sought by both commercial and recreational anglers. Pelagic finfish 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. Some pelagic species are highly migratory and are reported to be present in the near-coastal and shelf surface waters of the Southern New England-New York Bight in the summer, taking advantage of the abundant prey in the warm surface waters. Coastal migratory pelagic fish include fast-swimming, schooling fish species that range from shore to the continental shelf edge, and are sought by both recreational and commercial anglers. 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, 2013).

Ecologically, commercially, or recreationally important finfish (demersal and pelagic) were identified along the SFEC-NYS. Some demersal finfish are seasonal visitors to the SFEC-NYS area. Most demersal species are abundant in the cold season nearshore and offshore extending along the continental shelf and decline in the region during the warmer months (Scotti et al., 2010). Two demersal species of anadromous finfish are potentially present within the SFEC-NYS area: striped bass and Atlantic sturgeon (BOEM, 2013; Scotti et al., 2010).

Pelagic species are potentially abundant nearshore and offshore along the SFEC-NYS corridor in the warm season, and decline during the cold season (Scotti et al., 2010). There are five pelagic species of anadromous fish that are potentially present within the SFEC-NYS: American shad, alewife, blueback herring, Atlantic menhaden, and the Atlantic sea herring (BOEM, 2013; Scotti et al., 2010).

Table 4.9-1 – Economically and Ecologically Important Finfish Species Along or Within the Vicinity of the SFEC-NYS below, indicates the demersal and pelagic species of finfish identified as having the potential to be located along or within the vicinity of the SFEC-NYS along with the life stages of the species, its commercial or recreational importance, if it is a prey species, and its potential time of year within the vicinity of the SFEC-NYS.

Table 4.9-1 Economically and Ecologically Important Finfish Species Along or Within the Vicinity of the SFEC-NYS

Species	Eggs	Larvae	Juveniles	Adults	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region [a]
Demersal							
Atlantic Cod (*Gadus morhua*)[b]			•	•	X		Year-round, peak in winter and spring
Atlantic Halibut (*Hippoglossus hippoglossus*)[b]			•	•	X		Year-round
Atlantic Sea Herring (*Clupea harengus*)[b]	•				X	X	Winter
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)			•	•			October to May
Black Sea Bass (*Centropristis striata*)[b]			•	•	X		Spring to summer; summer to fall
Cunner (*Tautogolabrus adspersus*)			•	•		X	Year-round, hibernate in mud over winter
Haddock (*Melanogrammus aeglefinus*)[b]			•	•	X		Winter and spring
Little Skate (*Leucoraja erinacea*)			•	•	X		Year-round
Monkfish (*Lophius americanus*)[b]			•	•	X		Summer to fall
Northern Sea Robin (*Prionotus carolinus*)			•	•	X		Spring through fall
Ocean Pout (*Macrozoarces americanus*)	•	•	•	•	X	X	Late summer to winter

Species	Eggs	Larvae	Juveniles	Adults	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region [a]
Pollock (*Pollachius virens)*	•	•	•	•	X		Collected in November at Block Island Windfarm (BIWF)
Red Hake (*Urophycis chuss*)[b]			•		X	X	September to December Collected from April to July at BIWF
Sand Lance (*Ammodytes americanus)*	•	•	•	•		X	Year-round
Scup (*Stenotomus chrysops*)			•	•	X	X	Juveniles: winter to spring; Adults: October to December
Sea Raven (*Hemitripterus americanus)*	•	•	•	•			Collected Year-Round at BIWF
Smooth Dogfish (*Mustelus canis*)			•	•			Fall to winter Collected spring through fall at BIWF
Spiny Dogfish (*Squalus acanthias*)			•	•	X		Fall to winter Collected summer and fall at BIWF
Striped Bass (*Morone saxatilis*)			•	•	X		April to September
Summer Flounder (*Paralichthys dentatus)*[b]			•	•	X		Winter to spring Collected year-round at BIWF
Tautog (*Tautoga onitis*)			•	•	X	X	Winter
Tilefish (*Lopholatilus chamaeleonticeps*)		•	•		X		Larvae: July to September; Juveniles: April to July
Whiting (*Merluccius bilinearis*)[b]			•	•	X		Winter to spring
Windowpane Flounder (*Scophthalmus aquosus*)[b]			•	•	X	X	Summer to fall Collected year-round at BIWF
Winter Flounder (*Pseudopleuronectes americanus*)[b]	•	•	•	•	X	X	Eggs/Larvae: winter to early spring; Juveniles and Adults: year-round
Winter Skate (*Leucoraja ocellate*)			•	•	X		Summer and fall Collected year-round at BIWF
Wolffish (*Anarhichas lupus*)			•	•			November to June
Yellowtail Flounder (*Limanda ferruginea*)[b]			•	•	X	X	Year-round
Pelagic							
Albacore Tuna (*Thunnus alalunga*)			•		X		Summer to fall

Species	Eggs	Larvae	Juveniles	Adults	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region [a]
Alewife (*Alosa pseudoharengus*)			•	•	X	X	Mid July to October Collected January to May at BIWF
American Eel (*Anguilla rostrata*)		•	•	•	X		Juveniles or Adults: March through December. One adult collected in April at BIWF
American Plaice (*Hippoglossoides platessoides)*		•	•	•	X		Year-round Collected April to May at BIWF
American Shad (*Alosa sapidissima*)			•	•	X		Spring to summer
Atlantic Bonito (*Sarda sarda*)			•	•	X		Summer to fall
Atlantic Butterfish (*Peprilus triacanthus*)	•	•	•	•	X	X	Eggs/Larvae: July to September; Juveniles/Adults: spring Adults: Collected in summer and fall at BIWF
Atlantic Cod[c]	•	•			X	X	Winter and spring
Atlantic Halibut[c]	•	•			X	X	Winter and spring
Atlantic Sea Herring[c]		•	•	•	X	X	Larvae: August to December; Juveniles/Adults: spring and fall Juveniles/Adults: Collected January to March at BIWF
Atlantic Mackerel (*Scomber scombrus*)	•	•	•	•	X	X	Eggs/Larvae: April to June; Juveniles/Adults: late summer to fall Juveniles/Adults: Collected January through February at BIWF
Atlantic Menhaden (*Brevoortia tyrannus*)			•	•	X	X	Spring to summer
Atlantic Silverside (*Menidia menidia*)			•	•		X	Late fall to early spring
Basking Shark (*Cetorhinus maximus*)			•	•			Summer to fall
Bay Anchovy (*Anchoa mitchilli*)	•	•	•	•		X	Eggs and Larvae: spring, summer, fall Juveniles and Adults: year-round Populations expected to be low and more evident in the SFEC-NYS.
Black Sea Bass[c]	•	•			X	X	July to September

Species	Eggs	Larvae	Juveniles	Adults	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region [a]
Blueback Herring (*Alosa aestivalis*)			•	•	X	X	Summer to winter Collected in the winter at BIWF
Bluefin Tuna (*Thunnus thynnus*)			•	•	X		Spring to winter
Bluefish (*Pomatomus saltatrix*)	•	•	•	•	X	X	Eggs: March to May; Larvae: June to August; Juveniles collected in September, October and December at BIWF Adults: August to September; Adults collected in September, October, November, and May at BIWF
Blue shark (*Prionace glauca*)			•	•			June to November
Common Thresher Shark (*Alopias vulpinus*)			•	•			June to December
Conger Eel (*Conger oceanicus*)			•	•			Collected November to June at BIWF
Dusky Shark (*Carcharhinus obscurus*)			•				June to November
Haddock[c]	•	•			X	X	Winter and spring
Monkfish[c]	•	•			X	X	Summer to fall
Northern Sea Robin	•	•			X		Summer to fall
Red Hake[c]	•	•			X	X	May to December
Sandbar Shark (*Carcharhinus plumbeus*)			•	•			May to September
Sand Tiger Shark (*Carcharias taurus*)			•				May to September
Shortfin Mako Shark (*Isurus oxyrinchus*)			•	•			June to December
Skipjack Tuna (*Katsuwonus pelamis*)				•	X		Year-round
Spot (*Leiostomus xanthurus*)			•	•	X		October to May
Summer Flounder[c]	•	•			X	X	Fall
Tiger Shark (*Galeocerdo cuvieri*)			•				May to September
Weakfish (*Cynoscion regalis*)			•	•	X	X	Adults: June
White Shark (*Carcharodon carcharias*)			•				Summer to fall
Whiting[c]	•	•			X	X	Year-round
Windowpane Flounder[c]	•	•			X	X	Spring

Species	Eggs	Larvae	Juveniles	Adults	Commercial/ Recreational Importance	Prey Species	Potential Time of Year in Region [a]
Winter Flounder[c]		•			X	X	Winter to spring
Witch Flounder	•	•			X	X	Year-round
Yellowfin Tuna (*Thunnus albacares*)			•	•	X		Year-round
Yellowtail Flounder[c]	•	•			X	X	March to August

Sources: Bohaboy et al., 2010; Cargnelli et al., 1999a; Cargnelli et al., 1999b; Cargnelli et al., 1999c; Chang et al., 1999; Collette and Klein-MacPhee, 2002; Collie et al., 2008; Collie and King, 2016; Cross et al., 1999; Curtice et al., 2016; Demarest, 2009; Fahay et al., 1999a; Fahay et al., 1999b; Fairchild, 2017; Fisheries Hydroacoustic Working Group, 2008; Florida Fish and Wildlife Conservation Commission, 2017; Florida Museum of Natural History, 2017; GARFO, 2016; Hasbrouck et al., 2011; Johnson et al., 1999a; Johnson et al., 1999b; Knickel, 2017; Lipsky, 2014; Malek, 2015; Malek et al., 2010; Malek et al., 2014; Massachusetts Department of Energy and Environmental Affairs, 2017; MA EOEEA, 2015; McBride et al., 2002; McGuire et al., 2016; Morse et al., 1999; Morton, 1989; NOAA, 2010, 2015, 2016a, 2017a, 2017b, and 2017c; North Carolina Department of Environment and Natural Resources: Division of Marine Fisheries, 2017; NEFSC, 2017; Northeast Ocean Data, 2017; Packer et al., 1999, 2003a, 2003b, and 2003c; Pereira et al., 1999; Petruny-Parker et al., 2015; Popper et al., 2014; Reid et al., 1999; Rooker et al., 2007; Scotti et al., 2010; Siemann and Smolowitz, 2017; Steimle et al., 1999a, 1999b, 1999c, 1999d, and 1999e; Studholme et al., 1999; USFWS, 2017; URI EDC, 1998a and 1998b; Wilber et al., 2017

[a] Time of year information obtained from sources listed in the reference section. When available, species presence based on survey information from the BIWF (Block Island, Rhode Island) was provided from Wilber et al., 2017.

[b] This species also has life stages that are pelagic.

[c] This species also has life stages that are demersal.

Many species of finfish that have demersal life stages, identified in Table 4.9-1, are considered commercially or recreationally important. Fisheries in New York State territorial waters are primarily managed by NYSDEC. Black sea bass, bluefish, scup, and summer flounder are each individually managed under respective New York State Quota Distribution Programs (NYSDEC and NYSDOS, 2017). There is additional management for Atlantic cod, haddock, yellowtail flounder, American plaice, witch flounder, redfish, white hake, and pollock under the Groundfish Disaster Program (GDP) (NYSDEC and NYSDOS, 2017). The GDP was put into effect because NYSDEC determined in 2013 that these fish stocks were headed towards collapse and needed to have drastic reductions to their fishing quotas. The GDP proposed protection to their habitats to continue to sustainably fish those species. Summer flounder and scup were the top two finfish species landed by pounds by commercial fishermen in New York State territorial waters from the years 2008 to 2010 of all demersal species listed in Table 4.9-1 (Scotti et al., 2010).

Of the species with pelagic life stages potentially present along or within the vicinity of the SFEC-NYS, many species are considered commercially or recreationally important. The top two commercially fished finfish in 2010 in New York State territorial waters by abundance were: Atlantic menhaden and American shad (Scotti et al., 2010). The following pelagic species, listed in Table 4.9-1, are managed under the Atlantic Highly Migratory Species Fishery Management Plan: blue shark, common thresher shark, shortfin mako shark, and yellowfin tuna (NOAA, 2004).

4.9.1.1 Habitats

The SFEC-NYS is located within a portion of the Atlantic Ocean known as the New York Bight. New York Bight waters 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 finfish species that inhabit the area. Habitat varieties determine species, distribution, and predator/prey dynamics. Each habitat structure supports a community of finfish species that rely on the habitat to survive. Multiple factors directly affect spatial and temporal patterns of fish species. A summary of common habitat types for the finfish species that could potentially occur along or within the vicinity of the SFEC-NYS is provided in Table 4.9-2 – Common Habitat Types for Finfish Species Known to Occur in the Region, below.

Demersal finfish habitat includes the bottom substrate within continental shelf and shallow waters (Scotti et al., 2010). Demersal species interact with and consume benthic organisms. Because of this interaction, demersal species are reliant on the complex relationship between benthic habitats and species. More diverse fish communities occupy more complex habitats (Malek, 2015 and Malek et al., 2016). Some demersal species are present year-round; however, there are distinct variations in local populations because of seasonal migrations and inter-annual population dynamics (declines and increases) (Malek, 2015).

Three benthic habitats (sand sheets, sand with mobile gravel, and patchy cobbles and boulders on sand) were observed along the SFEC route (see Appendix G and Appendix J). Distribution varied as the SFEC route nears land in New York State territorial waters where waters are shallower than 25 feet (7 m). The SFEC route was dominated by sand sheet habitats, with mobile gravel present to a lesser extent. Sediment grain size was largely homogeneous. Deposits of very fine silt, on the order of six inches (15 cm) thick, were observed overlying sand at one location within New York State territorial waters (see Section 4.10, *Benthic and Shellfish Resources* for more detail).

Pelagic species occupy the surface to midwater depths from the shoreline to the continental shelf and beyond. Pelagic finfish species are characterized as estuarine, marine, and anadromous species. These classifications describe preferred habitats of pelagic finfish. Estuarine species tend to reside nearshore, whereas marine species are found offshore in deeper waters. Anadromous species prefer both nearshore and offshore areas, but migrate up rivers to lower salinity environments for spawning.

Table 4.9-2 – Common Habitat Types for Finfish Species Known to Occur in the Region

Species	Habitat Type by Lifestage
Demersal	
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 feet and 426 feet (40 and 130 m)but also midwater.
Atlantic Halibut	Juveniles: Coastal areas 65 feet to 196 feet (20 to 60 m) deep; sandy bottom. Adults: Areas at depths of 328 feet to 2,296 feet (100 to 700 m) over sand, gravel, or clay bottoms.
Atlantic sea herring	Eggs: Spawned at depths of 131 feet to 262 feet (40 to 80 m) on George's Bank on gravel (preferred); sand, rocks, shell fragments, aquatic macrophytes, and lobster pot structures.
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 feet to 787 feet (20 to 240 m) in channel environments. Adults: At depths of 98 feet to 787 feet (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 feet to 23 feet (4 to 7 m).
Haddock	Adults: Pebble gravel bottom at depths of 131 feet to 492 feet (40 to 150 m).
Little Skate	All Life Stages: Sandy/gravely bottoms at a depth range of less than 233 feet to 298 feet (71 to 91 m).
Monkfish	Juveniles/Adults: Bottom habitat, sand/shell mix, gravel or mud along the continental shelf, depths 82 feet to 656 feet (25 to 200 m).
Northern Sea Robin	Juveniles and Adults: Smooth, hard-packed bottom.
Ocean Pout	All Life Stages: Bottom habitats with rocky shelter from the intertidal continental shelf to 656 feet (200 m) deep.
Pollock	All Life Stages: Schooling fish living at various depths from near the surface to at least 600 feet (182 m) deep.
Red Hake	Juveniles: Use of shells and substrate as shelter; found less than 393 feet (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 feet to 55 feet (5 to 17 m). Adults: Soft, sandy bottom, near structures (ledges, artificial reefs, mussel beds) at a depth range less than 98 feet (30 m).
Sea Raven	All Life Stages: Prefer rocky ground; hard clay, pebbles, or sand from 300 feet to 630 feet (91 to 192 m) deep.

Species	Habitat Type by Lifestage
Smooth Dogfish	All Life Stages: Mostly nearshore but some have a depth range of 870 feet to 990 feet (145 to 165 m); prefer bottom habitats.
Spiny Dogfish	All Life Stages: Collected over sand, mud, and mud-sand transitions at depths ranging from three feet to 1,640 feet (1 to 500 m); do not travel to maximum depths in the fall.
Striped Bass	All Life Stages: Open waters along rocky shores and sandy beaches.
Summer Flounder	Adults: Prefer sandy habitats; captured from shoreline to 82 feet (25 m) deep.
Tautog	All Life Stages: Require complex, structured habitats with a hard bottom substrate; depths of 82 feet to 989 feet (25 to 30 m).
Tilefish	All Life Stages: 262 feet to 590 feet (80 to 180 m) depth along the outer part of the continental shelf to upper part of continental shelf.
Whiting	Juveniles: Bottom habitats; all substrate types; depths of 65 feet to 885 feet (20 to 270 m). Adults: Bottom habitats; all substrate types; depths of 98 feet to 1,066 feet (30 to 325 m).
Windowpane Flounder	Juveniles and Adults: Fine, sandy sediment; nearshore less than 246 feet (75 m) deep.
Winter Flounder	Eggs: Nearshore; mud to sand or gravel. Emerging evidence that spawning occurs offshore. Larvae: Nearshore; fine sand to gravel. Juveniles: 59 feet to 88 feet (18 to 27 m) deep; mud or sand-shell. Adults: Mostly nearshore up to 98 feet (30 m) deep; mud, sand, cobble, rocks, or boulders substrate.
Winter Skate	All Life Stages: Prefer sandy or gravelly substrates; spring depths from three feet to 984 feet (1 to 300 m); fall depths from three feet to 1,312 feet (1 to 400 m).
Wolffish	All Life Stages: Occupy complex habitats with large stones or rocks at a depth range of 131 feet to 787 feet (40 to 240 m).
Yellowtail Flounder	Juveniles: Sand or sand and mud; depth range of 16 feet to 410 feet (5 to 125 m). Adults: Sand or sand and mud; depth range of 32 feet to 1,181 feet (10 to 360 m).
Pelagic	
Albacore Tuna	All Life Stages: Deepwater habitats; depth range of zero feet to 1,968 feet (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.
American Plaice	Eggs and Larvae: Open waters; depth maximum 328 feet (100 m). Juveniles and Adults: High concentrations around 328 feet (100 m) deep; prefer sand and gravel substrates.
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 feet to 1,377 feet (270 m to 420 m).
Atlantic Cod	Eggs: Bays, harbors, offshore banks; float near water surface. Larvae: Open ocean and continental shelf area.
Atlantic Halibut	Eggs: Offshore drift suspended in the water column. Larvae: Nearshore areas near the water surface.
Atlantic Mackerel	Eggs: Shoreward side of the continental shelf; 32 feet to 1,066.27 feet (10 to 325 m) deep. Larvae: Offshore waters and open bays; 32 feet to 426 feet (10 to 130 m) deep. Juveniles: Nearshore areas; 164 feet to 229 feet (50 to 70 m) deep. Adults: Offshore, 32 feet to 1,115 feet (10 to 40 m) deep.
Atlantic Menhaden	All Life Stages: Nearshore and offshore.
Atlantic Sea Herring	All Life Stages: High energy environments; gravel seabed.

Species	Habitat Type by Lifestage
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.
Basking Shark	All Life Stages: Coastal and offshore; sometimes enters inshore bays.
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.
Black Sea Bass	Eggs: Coastal, upper water column. Larvae: Nearshore, mouths of estuaries, upper water column.
Blueback Herring	Adults: High energy environments; gravel seabed.
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.
Blue Shark	All Life Stages: Nearshore and offshore, surface dwelling, concentrated near fishing activity.
Common Thresher Shark	Juveniles: Shallower waters over the continental shelf (less than 656 feet [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 coast line 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 feet to 164 feet (10 to 50 m) with a maximum depth of 492 feet (150 m).
Monkfish	Eggs: Surface waters in areas that have depths of 49 feet to 3,280 feet (15 to 1000 m). Larvae: Pelagic waters in areas that have depths of 49 feet to 3,280 feet (15 to 1000 m).
Northern Sea Robin	Eggs and Larvae: Pelagic waters of the continental shelf.
Red Hake	Eggs: Water column within the inner shelf. Larvae: Coastal waters less than 656 feet (200 m) in depth.
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 feet to 213 feet (20 to 65 m) deep.
Sand Tiger Shark	All Life Stages: Nearshore ranging in depths from six feet to 626 feet (2 to 191 m); inhabit surf zone, shallow bays, and rocky reefs, and deeper areas around the OCS.
Shortfin Mako Shark	All Life Stages: Various areas of the water column; ranging depths, maximum depth 2,427 feet (740 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.
Tiger Shark	All Life Stages: Coastal, nearshore, and offshore continental shelf areas.
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.
Whiting	Eggs: Surface waters over continental shelf at depths of 164 feet to 492 feet (50 to 150 m). Larvae: Surface waters over the continental shelf at depths of 164 feet to 426 feet (50 to 130 m).
Windowpane Flounder	Eggs and Larvae: Occupy multiple areas in water column less than 229 feet (70 m) depths.
Winter Flounder	Larvae: Both nearshore and offshore.

Species	Habitat Type by Lifestage
Witch Flounder	Eggs: Deep; pelagic waters 164 feet to 278 feet (50 to 85 m) depths. Larvae: zero feet to 820 feet (0 to 250 m) depths.
Yellowfin Tuna	All Life Stages: epipelagic, oceanic fish found in the upper 328 feet (100 m) of the water column.
Yellowtail Flounder	Eggs: Pelagic - near-surface continental shelf waters. Larvae: Pelagic - mid-water column; movement limited to currents.

Sources: Auster and Stuart, 1986; Collette and Klein-MacPhee, 2002; and Malek et al., 2016

4.9.1.2 Common Prey of Finfish Species

Finfish species depend on a system of multiple trophic levels. Both demersal and pelagic fish species consume fish, shellfish, planktonic organisms, and detritus. Shellfish, worms, copepods, and other invertebrates are predominant types of prey for finfish within the SFEC-NYS area. The most common vertebrate finfish prey include alewife, Atlantic menhaden, northern sand lance, and whiting. Common prey of juvenile and adult finfish species that could potentially occur along or within the vicinity of the SFEC-NYS are summarized in Table 4.9-3 – Common Prey Species of Juvenile and Adult Finfish Species, below.

Table 4.9-3 Common Prey Species of Juvenile and Adult Finfish Species

Species	Prey Species
Demersal	
Atlantic Cod	Benthic invertebrates
Atlantic Halibut	Whiting, sand lance, ocean pout, and alewife
Atlantic Sturgeon	Benthic invertebrates
Black Sea Bass	Invertebrates and zooplankton
Cunner	Pipefish, mummichog, and invertebrates
Haddock	Amphipods
Little Skate	Sand lance, alewife, herring, cunner, silversides, tomcod, and whiting
Monkfish	Sand lance and monkfish
Northern sea robin	Shrimp, crabs, amphipods, squid, bivalve mollusks, and segmented worms
Ocean Pout	Sand dollars
Pollock	Herring and crustacea
Red Hake	Crustaceans
Sand Lance	Plankton
Scup	Fish eggs and invertebrates
Sea Raven	Herring, lance, sculpins, tautog, whiting, and both sculpin and sea-raven eggs
Smooth Dogfish	Crustaceans, particularly lobsters
Spiny Dogfish	Squid and fish
Striped Bass	Menhaden, anchovy, spot, amphipods, and sand lance
Summer Flounder	Windowpane, winter flounder, northern pipefish, Atlantic menhaden, bay anchovy, red hake, whiting, scup, Atlantic silverside, American sand lance, bluefish, weakfish, mummichog, rock crabs, squids, and shrimp
Tautog	Copepods and shellfish

Species	Prey Species
Tilefish	Crabs, squid, shrimp, shelled mollusks, annelid worms, sea urchins, sea cucumbers, and sea anemones
Whiting	Crustaceans
Windowpane Flounder	Invertebrates
Winter Flounder	Clams
Winter Skate	Smaller skates, eels, alewife, blueback herring, menhaden, smelt, sand lance, chub mackerel, butterfish, cunner, sculpins, whiting, and tomcod.
Wolffish	Mollusks and shellfish
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 Plaice	Sand dollars
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 Sea Herring	Copepods
Atlantic Silverside	Zooplankton, copepods, shrimp, amphipods, young squid, worms, insects, and algae
Basking Shark	Small crustaceans
Bay Anchovy	Mysid shrimp, copepods, small crustaceans and mollusks, and larval fish
Blueback Herring	Zooplankton
Bluefin Tuna	Herring and eels
Bluefish	Invertebrates and crustaceans
Blue Shark	Herring, mackerel, spiny dogfish, and various others
Common Thresher Shark	Pelagic fish and squid
Conger Eel	Butterfish, herring, eels, and invertebrates
Dusky Shark	Various pelagic fish
Sandbar Shark	Menhaden and crustaceans
Sand Tiger Shark	Small sharks, rays, squid, and lobster
Shortfin Mako Shark	Mackerels, tuna, and bonito
Skipjack Tuna	Pelagic fish and invertebrates
Spot	Bristle worms, mollusks, crustaceans, and plant and animal detritus
Tiger Shark	Fish and squids
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
Yellowfin Tuna	Large pelagic fish and squids

Sources: Auster and Stuart, 1986; Collette and Klein-MacPhee, 2002; Florida Fish and Wildlife Conservation Commission, 2017; Florida Museum of Natural History, 2017; Knickel, 2017; NOAA, 2010; USFWS, 2017; and URI EDC, 2017.

4.9.2 Potential Finfish Impacts and Proposed Mitigation

Construction, installation, and O&M activities associated with the SFEC-NYS have the potential to impact finfish species through both direct and indirect effects, as discussed in the following sections. However, the SFEC-NYS is not expected to have significant long-term impacts to finfish during any of the Project phases.

4.9.2.1 Potential Construction Impacts and Mitigation

Construction of the SFEC-NYS is not expected to have significant long-term effects on finfish. Many of the species possibly present along the SFEC-NYS have a completely pelagic lifestyle, and many other species have pelagic early life stages and are not dependent on benthic habitat. As such, modification or disturbance of the substrate is expected to have a negligible adverse impact on the habitat of pelagic species, if present. There is a potential for adverse impacts to finfish habitat of demersal species resulting from the Project, but because of the small acreage relative to the total area of surrounding finfish habitat, these are expected to be negligible to minor, localized, and short-term in nature.

Following completion of construction of the SFEC-NYS, the substrates at the SFEC-NYS will fundamentally remain the same as pre-construction conditions. This will allow for benthic infauna and epifauna to recolonize the disturbed areas, allowing them to continue to serve as foraging habitat for finfish species. The exception is the conversion of sand with mobile gravel substrate to hard bottom associated with the cable protection (e.g. concrete mattresses, etc.) for discrete portions of the SFEC-NYS. However, because of the small acreage associated with this conversion relative to the total area of available surrounding finfish habitat, these adverse impacts to finfish habitat are expected to be minor and short-term or long-term.

During construction of the SFEC-NYS, three activities may affect finfish: seabed disturbance, noise, and sediment suspension and deposition. Impacts resulting from discharges and debris are expected to be negligible. Accidental spill or release of oils or other hazardous materials will be managed through the Construction Contingency Plan to be included in the Project EM&CP. The Applicant will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.

Seabed Disturbance

Seabed disturbance during construction of the SFEC-NYS has been split into four categories: seabed preparation, vibratory pile driving for the temporary cofferdam, SFEC-NYS installation, and vessel anchoring. In general, seabed disturbance is expected to produce minor, direct or indirect effects to species, depending on the life stages present for each species.

Seabed Preparation

Seabed preparation activities at the SFEC-NYS during construction include removal of obstructions prior to installing the SFEC-NYS. A pre-lay grapnel run (PLGR) will be used to clear debris from the area prior to laying the SFEC-NYS. Demersal early life stages of species that have suitable habitat at the SFEC-NYS will experience minor, short-term, direct effects from seabed preparation and will most likely be subject to injury or mortality. While some mortality could occur to demersal early life stages, this impact is considered minor given the small area of impact. Demersal later life stages will experience minor to negligible, short-term, direct effects because older life stages are more mobile and more likely to leave the area during seabed preparation. However, individuals of these species may also experience limited injury or mortality. These effects are only expected for finfish species that have demersal life stages associated with sand sheets, sand with mobile gravel, or patchy cobble and boulder on sand habitats. Those that are associated with fine-grained sediments (silt and clay) are expected to have negligible effects as these are not expected to occur or only occur occasionally in the area. Areas with patchy cobble and boulder on sand habitat are expected to be largely avoided during activities.

Pelagic early and later life stages are generally more mobile and reside higher in the water column, so direct effects associated with seabed preparation are expected to be negligible and short-term. These species are expected to either temporarily vacate the area or will drift through the area with limited potential to be present in the direct impact area.

Finfish are expected to move back into the area following the disturbance. Habitat recovery from the grapnel runs may take up to one to three years to occur, during which habitat quality for benthic/demersal species may be decreased, resulting in a minor, long-term, and indirect effect for species that use those habitats (BERR, 2008; BOEM, 2012; Guarinello et al., 2017). Indirect effects associated with feeding may also occur; however, this will be dependent upon species. Feeding by some species may be disrupted as they will temporarily avoid the area; this will have some effect on pelagic species. Other species may be attracted to the disruption and prey on dislodged benthic species or other species injured or flushed during seabed preparation. This is expected to be a short-term, minor, indirect effect.

Vibratory Pile-Driving

Vibratory pile driving will be used to install the temporary cofferdam, if utilized, at the HDD exit point from the seabed. No impact pile driving is expected. Vibratory pile driving could crush benthic/demersal species, particularly eggs and larvae, but also less mobile older life stages that do not vacate the area. Negligible, short-term, direct effects are expected for pelagic early and later life stages because they are not expected to be at the bottom during work activities or subject to crushing or injury through placement of the materials.

SFEC-NYS Installation

Direct effects to the seabed associated with installation of the SFEC-NYS will take place within the area that had already been disturbed during the PLGRs. Installation of the SFEC-NYS will result in minor to negligible, short-term, direct effects to demersal early and later life stages.

Installation of the SFEC-NYS will occur via a mechanical/hydro-jet plow. Compared to open cut dredging/trenching, this method will minimize sediment disturbance and alteration of demersal finfish habitat.

SFEC-NYS installation is also expected to produce negligible to minor, short-term, direct effects to pelagic early life stages, and pelagic later life stages of smaller species because they may become impinged or entrained on the water pumps that will operate the mechanical/hydro-jet plow. Although the circulated seawater is released back into the ocean, it is assumed that all entrained eggs, larvae, and zooplankton will be killed. To assess the potential loss of fish and zooplankton related to this activity, an ichthyoplankton and zooplankton assessment was conducted using data from NOAA’s Marine Resource Monitoring, Assessment and Prediction Program and their subsequent Ecosystem Monitoring plankton sampling programs. The results indicate that total estimated losses of zooplankton and ichthyoplankton related to entrainment from installation of the SFEC were less than 0.001 percent of the total zooplankton and ichthyoplankton abundance present in the study region. Therefore, impacts to early life stages of finfish from entrainment caused by installation of the SFEC-NYS are expected to be negligible to minor and short-term.

Because of the slow speed of the equipment and limited size of the impact area, it is expected that most mobile demersal and pelagic finfish will leave the area; however, eggs, larvae, and other slower moving species may be subject to injury or mortality. The SFEC-NYS may also require cable protection (e.g. concrete mattresses, etc.) and the installation of this cable protection will result in minor, short-term, direct effects.

Similar to seabed preparation, minor long-term and short-term indirect effects for demersal species may include a longer period for prey species to recolonize the impact area resulting in reduced foraging habitat for finfish. Minor, short-term, direct impacts including a temporary feeding disruption during cable installation may occur; however, some species may also be attracted to the disturbance and increase feeding as SFEC-NYS installation may dislodge benthic prey species.

Vessel Anchoring

Effects associated with vessel anchoring during construction of the SFEC-NYS are expected to be similar to those discussed above in the Seabed Preparation and Vibratory Pile Driving section. Direct effects are expected to be minor and short-term and associated with mortality and or injury of demersal early life stage species and demersal later life stage species with limited mobility. Faster moving demersal species and pelagic species will be expected to temporarily vacate the impact area associated with the anchor or the area swept by the anchor chain. The extent of the effects will vary depending on the vessel type, number of vessels, and duration onsite, and as these numbers increase, the associated impact areas will also increase. Long-term indirect effects will be associated with habitat disturbance and associated recovery time from the areas impacted by the vessel anchors and areas swept by anchor chains.

Noise

The potential for noise to be generated during construction of the SFEC-NYS is the result of vessel use, including the dynamic positioning vessel (DPV) thrusters for cable installation and sheet pile cofferdam installation, by vibratory hammer. Vibratory pile driving is expected to cause minor short-term direct effects, while the other sources of noise are expected to have negligible effects.

Underwater acoustic modeling was conducted to evaluate various Project-related construction sounds including vibratory pile driving and use of DPV thrusters for cable installation (see Appendix E – Sound Study Technical Reports for further detail).

Hearing among fish varies among species and auditory physiology. Fishes hear sounds using pressure and particle motion and detect the motion of surrounding water (Popper et al., 2008). Finfish detect and have the potential to be affected by noise in different manners. Fish with swim bladders are generally sensitive to pressure waves, while those that lack swim bladders are more sensitive to particle motion. Generally pelagic species have swim bladders, while demersal species like halibut, flounders, and soles do not have swim bladders. In addition, different fish species vary greatly in their hearing structures and auditory capabilities, and this may change during different life stages.

Noise generated by vibratory pile driving for the potential installation of the temporary cofferdam has the potential for direct effects on finfish species, particularly those with swim bladders. Duration of the temporary cofferdam installation is estimated to be short (approximately 12-24 hours). Direct effects associated with sound pressure waves and particle motion may include changes in fish behavior. These noise-generating activities also have the potential to interrupt migration patterns of finfish through the area because they may avoid elevated noise levels. Effects associated with noise are expected to be short-term and minor with finfish returning to the area after the noise-generating activity has been completed.

Elevated noise levels are expected to cause some fish species to temporarily vacate the area, causing a short-term disruption in feeding, mating, and other essential activities. Less mobile species and benthic early life stages will be expected to be more susceptible to noise effects than more mobile species as they will not be able to leave the area as quickly (Gill and Kimber, 2005).

The underwater noise from the propeller blades of the DPV thrusters is the dominant noise source from vessels for the Project. DPV thrusters are known to generate significant underwater continuous noise. The zone of acoustic influence for injury will be concentrated right at the DPV itself. Fish within this area over the brief duration of DPV thruster use may experience noise that may temporarily alter their behavior. However, impacts of this magnitude are expected to be minor, and short-term.

Generally, the noise from mechanical/hydro-jet plow equipment is expected to be masked by louder sounds from vessels, especially DPV thrusters. 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, but may cause finfish to temporarily vacate the area. Minor, short-term, direct impacts are expected from mechanical/hydro-jet plow installation noise.

Sediment Suspension and Deposition

Increases in sediment suspension and deposition during construction of the SFEC-NYS will result from seabed disturbance caused by vessel anchoring, mechanical/hydro-jet plow installation of the SFEC-NYS, and limited excavation required at the cofferdam, if utilized. Direct effects associated with increased sediment suspension and depositions are expected to be negligible to minor and short-term in nature. Indirect impacts associated with increased suspended sediment and deposition include changes in habitat and species composition after sediments have settled out. These impacts are expected to result in negligible to minor, long-term, indirect impacts for benthic early and later life stages and negligible, short-term indirect impacts for pelagic early and later life stages as described in more detail below. Vessel mooring or anchoring activity resulting in sediment suspension is expected to be limited to areas of seabed immediately adjacent to the anchors. For mechanical/hydro-jet plow installation activities, a sediment transport study was completed that estimated the suspended sediment concentrations, sediment transport, and sediment deposition that may result from mechanical/hydro-jet plow installation of the SFEC-NYS, which is further discussed in Section 4.8, *Marine Physical and Chemical Characteristics* and Appendix H.

In a localized area of impact, these direct effects could involve mortality through sediment deposition and smothering of early demersal life stages of finfish and limited injury or mortality of later demersal life stages. Sediment deposition on eggs or larvae may result in smothering, potentially resulting in mortality (DOI-MMS, 2007). However, most older stages of finfish are expected to temporarily vacate the area to avoid the increased deposition.

Indirect effects associated with increased suspended sediment and deposition are changes in habitat composition and species composition after sediments have settled out. This change in habitat composition and species composition is similar to what is described in the seabed disturbance discussion above because habitat quality may be temporarily degraded and recolonization may take one to three years, depending upon the extent of the effects (BOEM, 2012). Given the localized extent of sediment deposition predicted (as discussed in Section 4.8, *Marine Physical and Chemical Characteristics* and Appendix H), the resulting impacts on benthic communities and habitat quality are expected to be negligible to minor and long-term for benthic early and later life stages. Sediment deposition is expected to result in no impact to pelagic early or later life stages.

4.9.2.2 Potential Operational Impacts and Mitigation

Two impacts during the operational phase of the SFEC-NYS include the potential to emit EMF and habitat conversion due to cable protection (e.g. concrete mattresses, etc.).

EMF are physical fields produced by electrically charged objects. Like all wiring and equipment connected to the electrical system, the EMF surrounding the SFEC-NYS will oscillate with a frequency of 60 Hertz (Hz). The magnetic field results from the flow of electricity along the cable and will be strongest at the surface of the cable and will decrease rapidly with distance from the cables. An electric field is created by the voltage applied to the conductors within the cable, but this electric field is totally shielded from the marine environment by grounded metallic sheaths and steel protection around the cable. Shielded electrical transmission cables do not directly emit electrical fields into surrounding areas, but are surrounded by magnetic fields that can cause induced electrical fields in moving water (Gill et al., 2012).

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SFEC-NYS was performed and results are included in Appendix P – EMF Reports. These modeling results were compared to published studies available in the scientific literature on the sensitivity of marine species to EMF. The modeling results and scientific literature analysis indicates that the EMF associated with the operational buried SFEC-NYS will not be detected by bony fish, elasmobranch, or invertebrate species. Given that the calculated values are below the thresholds of detection reported in the scientific literature, behavioral effects impacting regional abundances and distributions of such species are not expected.

Additional field data from 50 Hz submarine cable sites and offshore windfarms support this conclusion, indicating no distributional or behavioral effects on resident fish, elasmobranchs, or invertebrates. It should be noted that these conclusions are in line with the findings of a previous comprehensive review of the ecological impacts of Marine Renewable Energy (MRE) projects, where it was determined that "to date there has been no evidence to show that EMFs at the levels expected from MRE devices will cause an effect (whether negative or positive) on any species" (Copping et al., 2016).

Operational impacts from EMF are expected to be negligible on finfish along the SFEC-NYS, due to the burial depth (target depth of four feet to six feet [1 m to 2 m]) and shielding of the SFEC-NYS, as well as the results presented in Appendix P.

Habitat conversion, due to the use of cable protection (e.g. concrete mattresses, etc.), is expected to cause a long-term, minor, indirect impact resulting in a shift in species assemblages towards those found in rocky reef/rock outcrop habitat. This is known as the "reef effect" (Wilhelmsson et al., 2006; Reubens et al., 2013). This effect is also well known from other anthropogenic structures in the sea, such as oil platforms, artificial reefs piers, and shipwrecks (Claudet and Pelletier, 2004; Wilhelmsson et al., 2006; Seaman, 2007; Langhamer and Wilhelmsson, 2009). The impact is expected to be minor because cable protection is only anticipated to be used, at a maximum, for two percent of the SFEC-NYS's length. Additionally, data collected as part of the G&G survey along the SFEC-NYS corridor (Appendix G) indicates that sand sheet habitat is not a limiting habitat in the region. As a result, the conversion of a small area of sand sheet habitat to hard bottom habitat is unlikely to result in perceptible changes to the benthic community outside of the immediate area impacted.

Maintenance of the SFEC-NYS is considered a non-routine event and is not expected to occur with any regularity. Impacts associated with maintenance of the SFEC-NYS are expected to be similar but less frequent to those described for the construction/installation phase.

4.10 Benthic and Shellfish Resources

This section identifies all the benthic and shellfish resources that may be present in the coastal and marine regions crossed by the SFEC-NYS. Benthic and shellfish resources, including submerged aquatic vegetation (SAV), macroalgal assemblages, benthic habitats and biota, and shellfish, are described below, followed by an evaluation of potential impacts during construction, and O&M of the Project.

The following information is based on review of state and federal agency-published papers and databases, published journal articles, online data portals and mapping databases, and correspondence and consultation with federal and state agencies (NOAA, NYSDEC, etc.). In addition, the Applicant has completed surveys to establish baseline conditions of the SFEC-NYS corridor. These surveys include:

- G&G Surveys were completed between October to December, 2017 to characterize and evaluate seabed conditions (see Appendix G); and
- Benthic Habitat Surveys were conducted between November 11 – 15, 2017, in an effort to identify and confirm dominant benthic macrofaunal and macrofloral communities (see Appendix G and Appendix J).

4.10.1 Existing Benthic and Shellfish Conditions

Marine Geology

Regional geology and geomorphology is a product of glacial action and post-glacial coastal processes, which shaped the current benthos. The continental ice sheet advanced and retreated several times over the Project area, leaving behind a wide range of glacial deposits and outwash, depending on the location of the edge of the ice sheet at any given time. The geomorphology of the ocean bottom, shorelines, and island masses in the Project area are all products of glacial processes. In general, deposits range from fine-grained clays to sand, gravel, and interlaying boulders as evidenced on the exposed erosional cliffs of the offshore islands, such as Block Island (RICRMC, 2010).

The surficial expression of Project area was formed during the advance and retreat of the last continental ice sheet in the northeastern United States, part of the Laurentide glaciation, and the subsequent erosion and reworking of the glacial deposits during the Holocene (10,000 years ago to the present) sea-level rise. Characteristic glacial deposits are moraine and outwash. Glacial moraines are formed at the leading edge of an ice sheet when it is no longer advancing and melting has begun. Typically, moraine includes poorly sorted, fine-grained to gravel sediments with boulders, which can be called glacial till deposits. Glacial outwash (also referred to as glacial drift) is well-sorted material, formed from meltwater within glaciers or from drainage off the front of a glacier across an outwash plain. These can be thick deposits of primarily sandy material, and may include incised channels where meltwater drained. Following the glacial period, the shoreline transgressed across the area to its current location, leaving behind fine-grained to sandy fluvial-estuarine deposits (RICRMC, 2010). The area along or within the vicinity of the SFEC-NYS corridor is characterized as a medium-to-high energy wave environment, resulting in sandy deposits along the beach front and near shore. Varying amount of gravel and larger material up to boulders may also be present.

Submerged Aquatic Vegetation (SAV)

SAV are rooted, submerged vascular plants, such as eelgrass and widgeon grass, that grow completely underwater. The SFEC-NYS passes through areas that are shallow enough for SAV to be present; however, all known SAV beds identified in the vicinity are present within waters north of Long Island. No eelgrass beds were identified near the SFEC-NYS during a review of historical aerial imagery (Tiner et al., 2003; NYSDOS Seagrass Taskforce, 2009; Stephenson, 2009). In addition, because the SFEC-NYS is open to wave activity and is not located in shallow, sheltered, estuarine habitat, it is unlikely that SAV occurs along its corridor. No eelgrass beds were observed in the vicinity of the SFEC-NYS during the benthic habitat assessment (see Appendix J).

Macroalgal Assemblages

Macroalgae differ from SAV in that they are algae instead of vascular plants, and they lack complex reproductive structures and specialized functional tissues like roots, stems, leaves, and nutrient transport structures. Similar to SAV, macroalgae occurs in intertidal and subtidal zones where there is sufficient light penetration for photosynthesis to occur. Several macroalgal species are known to occur at depths greater than 328 feet (100 m), but the depth limit reported in New England waters is estimated to be 164 feet (50 m) (Markager and Sand-Jensen, 1992; Van Patten and Yarish, 2009; Edwards et al., 2012; Vadas and Steneck, 1988).

The SFEC-NYS is within shallow waters and therefore is subject to increased wave energy. Macroalgae within the vicinity of SFEC-NYS is expected to be limited in distribution, and primarily composed of floating algal masses and drifting algae, such as sea lettuce or wire weed. Presence of macroalgae, and types of macroalgae present will largely be dictated by water depths and substrate types along the SFEC-NYS corridor. No macroalgae was identified along the SFEC-NYS during the G&G survey and benthic habitat assessment (see Appendix G and Appendix J).

Common macroalgal species that could potentially occur along or within the vicinity of the SFEC-NYS are listed in Table 4.10-1 – Common Macroalgal Species Potentially Occurring Along or Within the Vicinity of the SFEC-NYS, below.

Table 4.10-1 Common Macroalgal Species Potentially Occurring Along or Within the Vicinity of the SFEC-NYS

Species	Preferred Habitat	Depth Range	Growth Type
Agarum cribrosum	Rocks, cobble	Subtidal to approximately 131 feet (40 m)	Single blade up to 59 inches (150 cm) with stipe attached to a holdfast
Coral weed (*Corallina officinalis*)	Rocks, cobble, large gravel, shells	Lower intertidal and subtidal	Coralline red algae that can encrust on rocks and shells. Grows to about four inches (10 cm)
Coralline red algae (Order Corallinales)	Rocks, cobble, large gravel, or epiphytic on shells or algae	Subtidal	Algal crusts
Foliose red algae (Phylum Rhodophyta)	Rocks, cobble, large gravel, or epiphytic on shells or algae	Subtidal	Low-growing, foliose red algae
Green Thread (*Chaetomorpha linum*)	Free floating/drifting. Often entangled with other algae	Upper Intertidal, and free-floating mats	Filamentous clumps and tangles
Gut weed (*Ulva intestinalis*)	Rocks, mud, sand, tide pools, epiphyte on other algae and shells	Intertidal-Upper Intertidal and free-floating mats	Unbranched flattened gas-filled tubes with undulating edges to approximately 16 inches (40 cm) long
Hooked red weed (*Bonnemaisonia hamifera*)	Rocks, cobble, large gravel, often epiphytic on shells and algae	Subtidal	Small, highly branched red foliose algae growing to four inches (10 cm)
Horsetail kelp (*Laminaria digitata)*	Rocks, large cobble	Subtidal in wave exposed areas	Large, wide, brown blade with central holdfast; grows to 39 inches (1 m)
Irish moss (*Chondrus crispus*)	Rocks	Subtidal	Shrub-like, densely branched. Grows to six inches (15 cm)
Kelp (*Saccharina latissimi*, S. *longicruris*)	Rocks, large cobble, rocky reef	Subtidal to approximately 115 feet	Single blades with stipe that grow to 36 feet (11 m) (*S. longicruris*)
Lacy red weed (*Callophyllis cristata*)	Rocks, cobble, large gravel, or epiphytic on shells or algae	Subtidal, deeper waters	Small, highly branched red foliose algae growing to two inches (5 cm)
Sargasso weed (*Sargassum filipendula*)	Free floating	Open water and embayments	Multibranched with small, gas-filled nodules

Species	Preferred Habitat	Depth Range	Growth Type
Sea lettuce (*Ulva lactuca*)	Rocks and rocky reefs, epiphyte on other algae and shells	Intertidal-Upper Intertidal and free-floating mats	Attached via holdfast; grows to approximately 7.1 inches (18 cm) in length
Wire weed (*Ahnfeltia plicata*)	Rocks and drift	Subtidal	Branched algae attached to bottom substrate or drifting

Note: No living macroalgae were observed during the SPI/PV survey.

[a] Vadas and Steneck, 1988; [b] McGonigle et al., 2011; [c] Van Patten and Yarish, 2009; and [d] Shimada et al., 2003

Benthic Habitats and Biota

The G&G surveys conducted along the SFEC-NYS (see Appendix G) identified generally homogenous surficial sediments, with grain sizes ranging from very fine sand to coarse sand. No boulders were observed along the SFEC-NYS corridor and water depths were measured, ranging from approximately zero feet to 82 feet (0 m to 25 m). Deposits of very fine silt were also identified along the SFEC-NYS corridor (approximately six inches [15 cm] thick).

The benthic habitat survey (see Appendix J) identified three unique benthic habitat types including patchy cobbles and boulders on sand, sand with mobile gravel, and sand sheets. The species found in these types of habitats are typically described as infaunal species, those living in the sediments (e.g. polychaetes, amphipods, mollusks), and epifaunal species, those living on the seabed surface (e.g. sea stars, sand dollars) or attached to substrates (e.g. barnacles, anemones). Within New York State territorial waters, sand sheets were the predominant habitat type. During the benthic habitat surveys, infaunal burrows and tubes, epifaunal tracks, and by sand dollars were observed in the sand sheet habitat (see Appendix J). No sensitive taxas were observed (e.g. squid eggs).

The frequent hydrodynamic forcing and subsequent sediment mobility in sand sheet and sand with mobile gravel habitats creates a dynamic environment for biota. Therefore, these habitats do not include more than occasional sparse presence of attached flora or sessile attached epifauna, and are, instead, inhabited by mobile epifauna, such as sand dollars, Jonah crabs, American lobster, and small tube-building and burrowing infauna. The dynamic nature of these environments results in high turnover of infauna, and, combined with the very low organic loads found in medium and coarse sands, limits the development of infaunal successional stages Because they are accustomed to a certain degree of natural disturbance, the benthic biological communities associated with these habitat types are considered generally resilient to change and quick to recover.

The potential for presence of the species and/or genera in the vicinity of SFEC-NYS is presented in Table 4.10-2 – Common Species in Various Substrate Types Along or Within the Vicinity of the SFEC-NYS, based on desktop review and the benthic habitat survey. Species and genera that were observed during the benthic habitat survey are identified below.

Table 4.10-2 Common Species in Various Substrate Types Along or Within the Vicinity of SFEC-NYS

Habitat Type	Phylum or Class	Species (With Common Name if Available)	References
Sand substrates	Asteroidea	Blood star	Tetra Tech EC, Inc, 2012
	Bivalvia	Atlantic sea scallop (*Plactopecten magellanicus*), ocean quahog (*Artica islandica*), *Nucula proxima*, Waved astarte (*Astarte undata*), chestnut astarte (*A. castanea*), Atlantic surf clam	Steimle, 1982; Zajac, 1998; Fay et al., 1983; Meyer et al., 1981; Cargnelli et al., 1999a
	Cephalopoda	Squid egg masses and newly hatched larvae	Macy and Brodziak, 2001; NEFSC, 2005
	Crustacea	Tube forming amphipods: including *Ampelisca agassizi* and *A. vadorum* American lobster, Atlantic rock crab, sand shrimp (*Crangon septemspinosis*), hermit crabs, Genus *Haustorid, Phoxocephalid, Leptocuma, Chiridotea, and Cancer* spp. Jonah crab (*Cancer borealis*)	Steimle, 1982; Wigley, 1968; Tetra Tech EC, Inc, 2012; Robichaud et al., 2000; Williams and Wigley, 1977
	Echinoidea	Sand dollar[a] (*Echinarachnius parma)*	Wigley, 1968; Tetra Tech EC, Inc, 2012
	Gastropoda	Northern moon snail (*Lunatia heros*), *Nassarius* spp., channeled whelk (*Busycotypus canaliculatus*), common slipper shell	Wigley, 1968; Tetra Tech EC, Inc, 2012; Peemoeller and Stevens, 2013
	Ophiuroidea	Not listed	Poppe et al., 2014
	Polychaeta	Surface feeding: *Exogone verugera, Prionospio steenstrupi, Anobothrus gracilis,* and *Paraonis gracilis* Tube forming[a]: *Spirorbis borealis, Ophelia bicornis,* and *Travisia carnea*	Steimle, 1982; Wigley, 1968
	Xiphosura	Horseshoe crab	ASMFC, 2010; NJDEP, 2016
Gravel/granule substrates	Asteroidea	Sea star, blood star, common sea star	Collie et al., 1997; Redmond and Scott, 1989; Dickinson et al., 1980
	Bivalvia	Waved astarte, chestnut astarte, genus *Placopecten*, including Atlantic sea scallop, eastern oyster (*Crassostera virginica*), ocean quahog	Collie et al., 1997; Redmond and Scott, 1989; Dickinson et al., 1980; Wigley, 1968; Jenkins et al., 1997; Hargis and Haven; 1999
	Cephalopoda	Squid egg masses, including longfin squid and newly hatched larvae	Macy and Brodziak, 2001; NEFSC, 2005
	Crustacea	Tube-forming Amphipods: *Ampelisca agassizi* and *A. vadorum* American lobster, sand shrimp, hermit crabs, Genus *Haustorid, Phoxocephalid, Leptocuma, Chiridotea,* and *Cancer* spp., Jonah crab (*Cancer borealis*), Atlantic rock crab	Collie et al., 1997; Redmond and Scott, 1989; Dickinson et al., 1980; Cobb and Wahle, 1994

Habitat Type	Phylum or Class	Species (With Common Name if Available)	References
	Gastropoda	Northern moon snail, *Nassarius* spp., channeled whelk, common slipper shell	Collie et al., 1997; Redmond and Scott, 1989; Dickinson et al., 1980
	Ophiuroidea	Genus *Ophiopholis* and *Ophiacantha*	Collie et al., 1997; Wigley, 1968
	Polychaeta	Tube-forming[a]: *Phyllochaetopterus socialis, Filograna implexa, Chone infundibuliformis, Protula tubalaria* Carnivorous and omnivorous: *Nephtys incisa, Eunice norvegica* Deposit feeding: *Thelephus cincinnatus*	Collie et al., 1997; Redmond and Scott, 1989; Dickinson et al., 1980

[a] Indicates taxa was observed in SPI/PV imagery for SFEC-NYS

Shellfish Resources

Ecologically and economically important shellfish species in the vicinity of the SFEC-NYS are discussed in Table 4.10-3 – Ecologically and Economically Important Shellfish Species Along or Within the Vicinity of the SFEC-NYS. Table 4.10-3 includes a summary of these species and the potential time of year that they could be present in the region and their potential presence.

The SFEC-NYS is expected to have increased densities of Northern quahog clam, Eastern oyster, Atlantic rock crab, Atlantic surf clam, and horseshoe crab because these species prefer shallower habitats.

Table 4.10-3 Ecologically and Economically Important Shellfish Species Along or Within the Vicinity of the SFEC-NYS

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Potential Presence along SFEC-NYS	References
American lobster (*Homarus americanus*)	All	Prefers rocky habitat, but may burrow in featureless sand or mud habitat.	Year-round	Potential presence in the vicinity of rocky areas along SFEC-NYS. May seasonally pass through the SFEC-NYS during migratory movements.	Collie and King 2016; ASMFC, 2015; Cobb and Wahle, 1994
Atlantic rock crab (*Cancer irroratus*)	All	Prefers depths ranging from 20 feet to 1,496 feet (6 to 456 m), but most common in waters less than 65 feet (20 m) deep. Prefers rocky and gravely substrate but also occurs in sand.	Year-round	Potential for presence in nearshore portions of SFEC-NYS.	Krouse, 1980; Robichaud et al., 2000; Williams and Wigley, 1977
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 feet (200 m).	Year-round	Potential for presence along the SFEC-NYS.	NEFSC, 2004; Mullen and Moring, 1986

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Potential Presence along SFEC-NYS	References
Atlantic surf clam (*Spisula solidissima*)	All	Prefers depths ranging from 26 feet to 216 feet (8 to 66 m) in medium grained sand, but may also occur in finer grained sediments. Burrows up to three feet (0.9 m) below the sediment/water interface.	Year-round	Potential for presence in sandy substrates along SFEC-NYS.	Fay et al., 1983; Meyer et al., 1981; Cargnelli et al., 1999a
Channeled whelk (*Busycotypus canaliculatus*)	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	Potential for presence in sandy substrates along the SFEC-NYS corridor. Potential for eggs to be laid in nearshore portions of the SFEC-NYS corridor.	Fisher, 2009; Peemoeller and Stevens, 2013
Eastern oyster (*Crassostera virginica*)	All	Larvae and adults can be found on hard bottom substrate or shell substrate to a depth of 36 feet (11 m) but is most common between eight feet to 18 feet (2.5 to 5.5 m) deep.	Year-round	Potential for presence in nearshore portions of the SFEC-NYS.	Jenkins et al., 1997; Hargis and Haven, 1999
Horseshoe crab (*Limulus polyphemus*)	All	Prefer depths shallow than 98 feet (30 m) but known to occur in depths greater than 656 feet (200 m). 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	Potential presence throughout the SFEC-NYS corridor. Juveniles may be present in higher densities in the vicinity of nearshore portions of the SFEC-NYS.	NJDEP, 2016; ASMFC, 2010
Jonah crab (*Cancer borealis*)	Adults	Prefers depths ranging from 164 feet to 984 feet (50 to 300 m), but also occurs in shallower waters, perhaps associated with circadian rhythms. Prefers rocky areas and areas with boulders and cobble.	Year-round	Potential for presence along the SFEC-NYS. Studies found higher adundances in fine sand, followed by coarse sand, and boulders on sand.	Collie and King, 2016;Robichaud and Frail, 2006; Jeffries, 1966
Longfin squid (*Loligo pealeii*)	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 feet and 550 feet (100 and 168 m) deep.	May-November	Limited potential for presence along at SFEC-NYS corridor between May-November, and eggs may be laid. Not expected to be present between December and April.	Macy and Brodziak, 2001; NEFSC, 2004
Northern quahog clam (*Mercinaria mercinaria*)	All	Mud and sandy habitats to depths up to 50 feet (15 m). Burrow into the sediments to a depth of two to four inches (5 and 10 cm).	Year-round	Potential presence in nearshore portions of the SFEC-NYS corridor.	Hill, 2004; DFO, 1996

Species	Life Stage Present	Preferred Habitat	Potential Time of Year in Region	Potential Presence along SFEC-NYS	References
Northern shortfin squid (*Illex illecebrosus)*	Adults	Prefers depths ranging from 328 feet to 656 feet (100 to 200 m) but is also known to occur in waters shallower than 60 feet (18 m). Egg masses are thought to be neutrally buoyant.	Year-round	Preferred depth range is deeper than the SFEC-NYS, so the species has limited potential for presence along the SFEC-NYS.	Black et al., 1987; Grinkov and Rikhter, 1981; O'Dor and Balch, 1985
Ocean quahog clam (*Artica islandica*)	Juveniles and Adults	Prefers depths ranging from 82 feet and 200 feet (25 and 61 m) in medium to fine grain sand.	Year-round	The SFEC-NYS corridor is outside of the preferred depth range of the species.	Cargnelli et al., 1999b

4.10.2 Potential Benthic and Shellfish Impacts and Proposed Mitigation

Construction, installation, and O&M activities associated with the SFEC-NYS have the potential to cause both direct and indirect impacts on benthic resources and shellfish, as discussed in the following sections. However, the SFEC-NYS is not expected to have long-term impacts to benthic resources and shellfish during any of the Project phases.

4.10.2.1 Potential Construction Impacts and Mitigation

Construction of the SFEC-NYS is not expected to have significant long-term impacts on benthic or shellfish resources. Impacts are largely expected to be negligible to minor, localized, and short-term in nature. During construction of the SFEC-NYS, three activities may affect benthic resources and shellfish: seabed disturbance, noise, and sediment suspension and deposition. Impacts resulting from discharges and debris are expected to be negligible. Accidental spill or release of oils or other hazardous materials will be managed through the Construction Contingency Plan to be included in the Project EM&CP. The Applicant will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.

Seabed Disturbance

Seabed disturbance during construction of the SFEC-NYS has been split into four categories: seabed preparation, vibratory pile driving for temporary cofferdam installation, SFEC-NYS installation, and vessel anchoring. In general, seabed disturbance is expected to produce minor, direct or indirect impacts to species depending on the mobility of the benthic species and shellfish species.

Seabed Preparation

Clearing and leveling of the seabed and PLGR to prepare areas for installation of the SFEC-NYS will result in minor, short-term, direct impacts including mortality to benthic species that are within the area of impact. Benthic species are expected to recolonize the impact area following construction activities and this may occur within months or one to three years of disturbance (BERR, 2008; BOEM, 2012). Recolonization rates of benthic habitats are driven by the benthic communities inhabiting the area surrounding the impacted region. Communities well adapted to disturbance within their habitats (e.g. sand sheets) are expected to quickly recolonize a disturbed area, while communities not well adapted to frequent disturbance (e.g. deep boulder communities) may take upwards of a year to begin recolonization, resulting in minor, long-term, direct impacts. Impacts to benthic resources will be limited to the area of direct disturbance. Minor, short-term, direct impacts may also include disruption of feeding during seabed preparation; however, post- seabed preparation predatory infaunal and epifaunal species may be attracted to the area to prey upon dislodged or injured organisms.

Vibratory Pile Driving

Vibratory pile driving will be used to install the temporary cofferdam, if utilized, at the HDD exit point. Direct impacts will be primarily associated with the placement of the piles and the potential to crush benthic species. This is expected to be a minor, short-term, impact for sessile and slow-moving species, while mobile species are expected to have a reduced potential for direct impacts because they will be expected to temporarily vacate the area where the piles will be placed. Similar to discussion above regarding seabed preparation, in the area disturbed by vibratory pile driving, benthic species will be expected to recolonize the impact area following the disturbance.

SFEC-NYS Installation

Direct effects to the seabed associated with installation of the SFEC-NYS will take place within the area that had already been disturbed during the PLGRs. Installation of the SFEC-NYS will result in minor to negligible, short-term direct effects to benthic species.

Installation of the SFEC-NYS will occur via a mechanical/hydro-jet plow. Compared to open cut dredging/trenching, this method will minimize sediment disturbance and alteration of habitat. In addition, use of DPV for cable installation for the SFEC-NYS will minimize impacts to surficial geology, as compared to use of a vessel relying on multiple-anchors.

Sessile and slow-moving benthic species, including infaunal species that cannot get out of the way of the mechanical/hydro-jet plow, may be subject to mortality and injury to individuals. Because of the slow speed of equipment and limited size of the impact area, it is expected that most mobile benthic species, such as Atlantic rock crab and horseshoe crab, will be able to move out of the way and not be subject to mortality, but may experience minor, short-term, direct impacts.. Sessile and slower moving species, such as clams, may be subject to mortality and/or injury if within the impact area.

At the sea-to-shore transition, HDD will be utilized rather than the mechanical/hydro-jet plow. During HDD, fluids are pumped into the borehole to lubricate it and aid in the return of drilled sediments. These fluids typically consist of bentonite clay and water with some stabilizing compounds (e.g. drilling mud). During the HDD event, the bentonite-sediment slurry is managed landside at the entry pit through a recycling system. However, the bentonite slurry can be released to the seabed into the water column. The pressure from boring causes an upward rupture of the seabed at the terminus of the borehole. When an unexpected rupture occurs followed by a release of drilling mud, this is known as a frac-out.

In the event of a frac-out, a series of containment and cleanup procedures are implemented. These procedures are typically described in a HDD inadvertent release control plan. The bentonite slurry is viscous and tends to easily coagulate. These properties allow for cleanup of releases, if necessary, through a vacuum or suction dredge system designed for that purpose.

In the event of drilling mud release out of the end of the completed borehole, the cofferdam (steel sheet piles or gravity) contains the material in a confined space. Any significant volume of the material within the confined space can be recovered as described. In either case, drilling mud will not be purposely released into the marine environment. If it does, it is expected to be confined and cleaned up so that a plume will not move through and about the water column.

If a drilling mud release occurs, it is expected to result in minor, short-term impacts due to seabed disturbance at the frac-out location. If any benthic organisms are in the vicinity of the release, impacts to those few individuals will occur. Species such as Atlantic rock crab and horseshoe crab are mobile and expected to vacate the impact area associated with the installation of the SFEC-NYS and any areas requiring cable protection (e.g. concrete mattresses, etc.). Northern quahog clam, eastern oyster, and Atlantic surf clam may be subject to mortality or injury if they are present in the impact areas. A Construction Contingency Plan will be developed within the Project EM&CP, which will describe procedures to contain and clean-up a frac-out.

Similar to Seabed Preparation, negligible to minor, long-term and short-term indirect impacts may include longer-term recolonization of the affected area, and short-term disruption of feeding of benthic species.

Vessel Anchoring

Effects associated with vessel anchoring are similar to those expected for seabed preparation and vibratory pile driving. Direct effects are expected to be minor and short-term from the mortality and or injury of slow-moving or sessile species directly in the impact area of the anchor or area swept by the anchor chain. The extent of the effects will vary depending on the vessel type, number of vessels, and duration onsite; as these numbers increase, the associated impact areas will also increase. Long-term, indirect effects will be associated with habitat disturbance and associated recovery time from the areas impacted by the vessel anchors and areas swept by anchor chains.

Noise

Direct impacts associated with noise during construction of the SFEC-NYS may occur during vibratory pile driving, installation of the SFEC-NYS (DPV thrusters), or from vessels. Vibratory pile driving, if utilized, is expected to cause minor, short-term direct, while the other sources of noise are expected to have negligible impacts. Expected impacts from these activities are discussed separately in the following sections. Criteria for assessing injury to invertebrates associated with sound levels and sound exposure levels have not been established.

Because benthic species and shellfish lack gas-filled organs, they appear to be less sensitive than finfish and marine mammals to pressure waves. Few marine invertebrates have the sensory organs to perceive sound pressure, but many can perceive particle motion (Vella et al., 2001). Vibratory pile driving in water causes sound energy to radiate directly into the water by vibrating the pile between the surface of the water and the bottom, and indirectly from ground-borne vibration at the bottom substrate. Direct impacts will be experienced by those organisms close enough to the vibratory pile driving to be exposed to injurious or disturbing sounds and vibrations. Duration of the temporary cofferdam installation is estimated to be short (approximately 12-24 hours) and effects associated with noise are expected to be minor and short-term with benthic resources returning to the area after the noise-generating activity has been completed.

The underwater noise from the propeller blades of the DPV thrusters is the dominant noise source from vessels for the Project. Vessel noise may cause temporary behavioral changes; however, this is not expected to be different than what currently occurs when vessels transit the area. As a result, short-term, negligible, direct impacts from SFEC-NYS installation and vessel noise could be anticipated.

Sediment Suspension and Deposition

Increases in sediment suspension and deposition during construction of the SFEC-NYS can result from seabed disturbance caused by vessel anchoring, installation of the SFEC-NYS, and limited excavation required at the cofferdam, if utilized. These activities have the potential to cause localized increases in sediment suspension and deposition in adjacent areas as the sediment suspension settles out of the water column. Direct impacts associated with increased sediment suspension and deposition are expected to be minor to short-term for sessile species and species with limited mobility and negligible and short-term for mobile species. Minor, long-term, direct impacts associated with habitat loss through sediment deposition in surrounding areas are anticipated. Vessel mooring or anchoring activity resulting in sediment suspension and deposition is expected to be limited to areas of the seabed immediately adjacent to the anchors. For mechanical/hydro-jet plow installation activities, a sediment transport study was completed that estimated the suspended sediment concentrations, sediment transport, and resulting sediment deposition from mechanical/hydro-jet plow installation of the SFEC-NYS, which is further discussed in Section 4.8, *Marine Physical and Chemical Characteristics* and Appendix H.

Increased deposition could result in mortality of benthic organisms through smothering and irritation to respiratory structures; however, mobile benthic organisms are expected to temporarily vacate the area and move out of the way of incoming sediments (DOI MSS, 2007). Eggs and larval organisms are especially susceptible to smothering through sedimentation, and 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 (BERR, 2008). Maurer et al. (1986) found that several species of marine benthic infauna (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 three in (eight cm) of various types of sediment (from predominantly silt-clay to pure sand).

Recolonization of areas covered in sediment may take months to years to occur, and studies associated with cable laying found that benthic infauna were still recovering two years after the cable-laying activity had ceased (Gill, 2005; DONG Energy et al., 2006). Increased sediment suspension and deposition could also result in a reduction in feeding success of benthic species because prey species may be covered or temporarily vacate the area. Levels of TSS could also reach lethal or sub lethal levels for benthic species; however, given the limited extent and duration of the elevated Project-related TSS concentrations, this is anticipated to be a minor impact to the benthic population. Indirect impacts may also include mobilization of contaminants within the sediments; however, the SFEC-NYS are not located near a known disposal site, so this is unlikely.

Sand sheet and mobile sands found near the SFEC-NYS are often more dynamic in nature; therefore, they are quicker to recover than more stable environments, such as fine-grained habitat and rocky reefs (Dernie et al., 2003). Species found in more dynamic and sandy areas are often adapted to deal with more dynamic habitats and handle increases in sedimentation associated with wind and waves.

4.10.2.2 Potential Operational Impacts and Mitigation

Two impacts during the operational phase of the SFEC-NYS include the potential to emit EMF and habitat conversion due to cable protection (e.g. concrete mattresses, etc.).

A modeling analysis of the EMF anticipated to be produced during operation of the SFEC-NYS was performed and results are included in Appendix P. These modeling results were compared to published studies available in the scientific literature on the sensitivity of marine species to EMF. Exposure to EMF could be short- or long-term, depending on the mobility of the species. Mobile species are likely to pass through the area, and be temporarily exposed. Sessile species, which are unable to move, will be exposed for the entire duration that the SFEC-NYS cable is energized (BERR, 2008; Woodruff et al., 2012; Love et al., 2015, 2016).

Aquatic crustaceans, a group that includes commercially important crab and lobster species, have been observed to use geomagnetic fields to guide orientation and migration, which suggests that this group of organisms is capable of detecting static magnetic fields (Ugolini and Pezzani, 1995; Cain et al., 2005; Boles and Lohmann, 2003; Lohmann et al. 1995). The ability to detect geomagnetic fields, however, is likely integrated with other environmental cues, including slope, light, currents, and water temperature. The potential for direct impacts to mobile species are also expected to be minimized as the SFEC-NYS will be AC and the electrical field will be limited in size by a magnetic sheath on the cable, and by burying it below the sediment surface.

The impacts of EMF associated with AC cables, if present, will be most visible in communities colonizing the cable protection (e.g. concrete mattresses, etc.) of the SFEC-NYS. It is anticipated that EMF will have a negligible long-term impact on sessile species. Appendix P further details the potential impacts of EMF on benthic and shellfish resources.

Habitat conversion, due to the use of cable protection (e.g. concrete mattresses, etc.), is expected to cause a long-term, minor, indirect impact resulting in a shift in species assemblages towards those found in rocky reef/rock outcrop habitat, this is known as the “reef effect” (Wilhelmsson et al., 2006; Reubens et al., 2013). This effect is also well known from other anthropogenic structures in the sea, such as oil platforms, artificial reefs piers, and shipwrecks (Claudet and Pelletier, 2004; Wilhelmsson et al., 2006; Seaman, 2007; Langhamer and Wilhelmsson, 2009). The impact is expected to be minor because protection is only anticipated to be used, at a maximum, two percent of the SFEC-NYS’s length. Additionally, data collected as part of the G&G survey along the SFEC-NYS corridor (see Appendix G) indicates that sand sheet habitat is not a limiting habitat in the region. As a result, the conversion of a small area of sand sheet habitat to hard bottom habitat is unlikely to result in perceptible changes to the benthic community outside of the immediate area impacted.

Maintenance of the SFEC-NYS is considered a non-routine event and is not expected to occur with any regularity. Impacts associated with maintenance of the SFEC-NYS are expected to be similar but less frequent to those described for the construction/installation phase.

4.11 Important Habitats and Rare, Threatened, and Endangered Species

This section evaluates the potential to encounter important habitats (i.e. EFH, State-designated areas, Significant Natural Communities) and RTE species protected under New York State and/or under the Endangered Species Act of 1973 (ESA), as well as marine mammals protected under the Marine Mammals Protection Act of 1972 (MMPA). This section includes mitigation techniques to eliminate or diminish potential impacts throughout the construction and operational phases of the Project.

4.11.1 Existing Important Habitats and Rare, Threatened, and Endangered Species

In order to determine the possible presence of important habitats and RTE species, the Applicant coordinated with state and federal agencies, completed a literature review, and conducted field surveys to identify a list of expected species and habitats along or within the vicinity of the Project.

Agencies contacted for information regarding important habitats and RTE species include the USFWS, the NYNHP, and the NOAA.

Onshore field surveys for the Project were conducted between May 24 and November 8, 2017. Detailed results of the onshore field surveys are included within Appendix A.

Offshore field surveys for the SFEC-NYS were not performed. To identify the potential presence of aquatic RTE species along the SFEC-NYS, the Applicant conducted a literature review and coordinated with the NYSDEC, the USFWS, and the NOAA.

4.11.1.1 Rare, Threatened, and Endangered Species

Federally- and State-listed RTE species that may be potentially located in the vicinity of the Project were identified based on agency correspondence and coordination, literature review, and field surveys. The Project was reviewed by the USFWS on May 1, 2018 and six federally-listed RTE species were identified. A response letter from NYNHP was received on March 19, 2018, identifying five state-listed RTE or special concern species in the vicinity of the Project.

Based on correspondence with the NYNHP, no historic species were identified that have the potential to be located along or within the Project.

Table 4.11-1 – Summary of RTE Species Potentially Occurring Along or Within the Project lists the RTE species that may potentially occur along or within the Project identified from agency correspondences, literature reviews, and field surveys. All correspondence with the USFWS and the NYNHP is located within Appendix K.

Table 4.11-1 Summary of RTE Species Potentially Occurring Along or Within the Project

Species		Common Name	Potential Presence	State (S)/ Federal (F) Listing
Plants	*Agalinis acuta*	sandplain gerardia	Suffolk County	(F) Endangered
	Amaranthus pumilus	seabeach amaranth	Suffolk County	(F) Threatened
Insects	*Hemileuca maia ssp. 5*	coastal barrens buckmoth	Vicinity of the East Hampton Airport	(S) Special Concern
Birds	*Charadrius melodus*	piping plover	Nesting area near the Beach Lane landing site	(S) Endangered / (F) Threatened
	Calidris canutus rufa	red knot	Suffolk County and Atlantic Ocean	(F) Threatened
	Sterna dougallii dougallii	roseate tern	Suffolk County and Atlantic Ocean	(F) Endangered
	Sternula antillarum	least tern	Nesting area near the Beach Lane landing site	(S) Threatened
	Sternula hirundo	common tern	Beach Lane landing site shoreline	(S) Threatened
Mammals	*Myotis septentrionalis*	northern long-eared bat	Suffolk County	(F) Threatened
	Megaptera novaeangliae	humpback whale	Atlantic Ocean, Year-round	(S) Endangered
	Balaenoptera physalus	fin whale	Atlantic Ocean, Year-round	(S) Endangered
	Eubalaena glacialis	North Atlantic right whale	Atlantic Ocean, Year-round	(F) Endangered, Strategic[a]
	Physeter macrocephalus	sperm whale	Atlantic Ocean, Summer	(F) Endangered
Reptiles	*Chelonia mydas*	green sea turtle	Atlantic Ocean, May to November	(F) Threatened
	Caretta caretta	loggerhead sea turtle	Atlantic Ocean, May to November	(F) Threatened
	Lepidochelys kempii	Kemp's ridley sea turtle	Atlantic Ocean, May to November	(F) Endangered
	Dermochelys coriacea	leatherback sea turtle	Atlantic Ocean, May to November	(F) Endangered
Finfish	*Acipenser oxyrinchus oxyrinchus*	Atlantic sturgeon	Atlantic Ocean, October to May	(F) Endangered
	Acipenser brevirostrum	shortnose sturgeon	Atlantic Ocean	(F) Endangered

[a] Strategic stock is defined as any marine mammal stock which:

- Is declining and likely to be listed as threatened under the ESA; or
- Level of direct human-caused mortality exceeds the potential biological removal level.

Additional information on each of these species is included below.

Plants

Sandplain Gerardia (*Agalinis acuta*)

Sandplain gerardia, a federally-listed endangered species, historically are found within Maryland, Connecticut, New York, Massachusetts, and Rhode Island. Sandplain gerardias are traditionally maintained by fire and grazing and were once dominant along Long Island. Sandplain gerardia "now survives in remnant grasslands in pine barrens with broad, grassy swaths; remnants of the Hempstead Plains dominated by grasses and composites with scattered shrubs and bare areas scraped by a bulldozer; and other remnant grasslands of the South Fork including those around golf courses, and along roadsides and railroads" (NYNHP, 2017c).

Seabeach Amaranth (*Amaranthus pumilus*)

Seabeach amaranth, a federally-listed threatened species, is typically found on barrier island beaches that are over 65 feet (19.8 m) wide. Protection from foot traffic and vehicles is critical in Seabeach amaranth growth. Seabeach amaranth is only known to be located in "Long Island, ranging from Coney Island to near the east end of the South Fork along the southern shore" (NYNHP, 2017d).

Insects

Coastal Barrens Buckmoth (*Hemileuca maia ssp. 5*)

Coastal barrens buckmoth, a special concern species with New York State, "in general have a wingspan of two to three inches (5 to 8 cm), and black forewings and hind wings, with white semi-translucent bands in the middle." Coastal barrens buckmoths only live within the following ecological communities on Long Island: Pitch Pine-scrub Oak Barrens, Dwarf Pine Plains, and Pitch Pine-Oak-Heath Woodlands. Coastal barrens buckmoth reproduce in October, which is when they are most active, flying around during the day. Female coastal barrens buckmoths lay their eggs primarily on scrub oaks (*Quercus ilicifolia*), which is also the sole foodplant for larvae (NYNHP, 2017f).

Birds

Piping Plover (*Charadrius melodus*)

The Atlantic Coast piping plover, a state-listed endangered and federally-listed threatened species, is a pale-colored, small and stocky bird with a relatively short bill. The piping plover migrates from its wintering grounds (South Atlantic, Gulf Coast, and Caribbean) to its breeding grounds (between North Carolina and eastern Canada) in early- to mid-March. Preferred nesting habitats of the piping plover include: dry sandy beaches, dredge spoil areas, or dunes with little to no vegetation. On Long Island, there are approximately 200 breeding pairs that nest exclusively between Queens and the Hamptons, including the eastern bays and harbors of northern Suffolk County. In the Town of East Hampton, there were 35 pairs of piping plover at 12 active nests in 2017 (Town of East Hampton, 2017). In early September, piping plovers leave their breeding grounds for wintering areas (NYSDEC, 2016b).

Red Knot (*Calidris canutus rufa*)

Red knot, a federally-listed threatened species, is identified by its wingspan of approximately 20 inches (51 cm) and its red-robin chest during the spring. Red knots are known for traveling great distances during migration, some traveling more than 9,300 miles (15,000 km) every fall. Red knots are known to winter on the mid-Atlantic and southern coasts of the United States, with some traveling as far as South America. During the summer months, red knots breed in northern Canada and northern Alaska. Typical winter and migration habitats of red knot include coastal mudflats, open sandy beaches, and tidal zones (National Audubon Society, 2018; USFWS, 2018a). Heavy concentrations of migrant red knots can occur on the south shore of Long Island in spring (April and May) and fall (July through October).

Roseate Tern (*Sterna dougallii dougallii*)

The Atlantic Coast roseate tern, a federally-listed and state-listed endangered species, is approximately 15 inches (38 cm) in length, with a white body and light-gray/black wings. During the breeding season, roseate terns have a rosy chest and belly (USFWS, 2017c). Roseate terns arrive at their breeding grounds between April and early May. Along the Atlantic Coast, the roseate tern breeds on islands in New York State northward to Nova Scotia. Breeding roseate terns concentrate primarily in two locations: Great Gull Island, New York, located within a string of islands that separate Long Island and Block Island sounds; and three islands in Buzzards Bay, Massachusetts (Bird, Ram, and Penikese islands). Great Gull Island and the three Buzzard Bay islands support over 90 percent of the nesting roseate terns in the northeast population (USFWS, 2010; Loring et al., 2017). Staging roseate terns have been reported in large flocks with other terns at inlets and islands from Long Island to Maine in late summer (mid-July to mid-September) (Veit and Petersen, 1993; Shealer and Kress, 1994), before departing on their southbound migration.

Common Tern (*Sterna hirundo*)

Common tern, a New York State-listed threatened species, is the most widespread and abundant tern in New York State. Common tern habitat includes sand and shell beaches, grassy uplands primary on islands, and rocky inland shores in North and South America. Common terns breed along the Atlantic Coast of North America. In New York, common terns predominately nest on Long Island. From late-April to mid-May, they return to their breeding colonies on Long Island (NYSDEC, 2018c).

Least Tern (*Sternula antillarum*)

Least tern, a state-listed threatened species, is the smallest American tern (approximately one ounce). The coastal least tern (*S. a. antillarum*) breeds north to coastal Maine, east to the Bahamas, south through the West Indies, and eastern Mexico to Venezuela (Thompson et al., 1997). On Long Island, least terns frequently nest on peninsulas, barrier islands, and sandy shorelines on bays and the coast (MacLean et al., 1991 as cited by Thompson et al., 1997; Town of East Hampton, 2015; Town of East Hampton 2017). In 2017, nest monitoring estimated 125 pairs of least terns in the Town of East Hampton (Town of East Hampton, 2017). Least terns arrive at their breeding grounds between late-April to mid-May and are commonly found nesting in association with piping plover (NYSDEC, 2017a). Least terns are relatively common in coastal New England and Long Island from May through August.

Mammals

Northern Long-eared Bat (*Myotis septentrionalis*)

Northern long-eared bat (NLEB), a federally-listed and state-listed threatened species, is one of the bat populations most dramatically impacted by white-nose syndrome, the main cause of its decline (USFWS, 2018b). NLEBs body varies from three to 3.7 inches (7.6 to 9.4 cm) in length with a wingspan of nine inches (23 cm). NLEBs spend their winter hibernating in caves and mines that sustain a constant temperature, high humidity, and lack air currents. During the summer, NLEBs roost and breed in crevices of live trees and snags, singly or in a colony. NLEBs range spans the eastern and north central United States, and south central Canada from the Atlantic Coast to eastern British Columbia (USFWS, 2015). NLEBs use a variety of terrestrial environments on Long Island for foraging and roosting during the summer breeding and migration periods between April and November.

Humpback Whale (*Megaptera novaeangliae*)

Humpback whale, a state-listed endangered species, can be found worldwide in all major oceans from the equator to sub-polar latitudes. In the summer, humpback whales are found in higher latitudes feeding in the Gulf of Maine and Gulf of Alaska. During the winter months, humpback whales migrate to calving grounds in subtropical or tropical waters, such as the Dominican Republic in the Atlantic and Hawaiian Islands in the Pacific (NOAA, 2017d). Whales from the North Atlantic feeding areas mate and calve in the West Indies (Hayes et al., 2017).

In the 1980s, numerous sightings of humpbacks were reported between Long Island and Martha's Vineyard by Montauk and Galilee whale-watching boats. Montauk boats reported two sightings in 1986, and 63 sightings in 1987 (Kenney and Vigness-Raposa, 2010). Recently, multiple humpbacks were reported feeding off Long Island during July 2016 and near New York City during November to December 2016 (Waring et al., 2016). Humpback strandings have also been reported along the southern shore of eastern Long Island in February 1992, November 1992, October 1993, August 1997, and April 2004. Humpbacks do occur along or within the Project area; however, their presence is relatively unpredictable and may be strongly influenced by prey availability (Kenney and Vigness-Raposa, 2010). During most years, their occurrence within the Project area would be rare; however, they may become locally abundant in certain years.

Fin Whale (*Balaenoptera physalus*)

Fin whale, a state- and federally-listed endangered species, have a wide distribution and can be found in the Atlantic, Pacific and Southern Hemisphere (NMFS, 2010). The population is divided by ocean basins; however, these boundaries are arbitrary as these are based off historical whaling patterns rather than biological evidence (NMFS, 2010). In the Northeastern United States, fin whales are the most commonly sighted species and account for 47 percent of the large whale sightings in the area (CETAP, 1982). They have been observed in all four seasons, and their distribution ranges from the continental shelf waters from the Mid-Atlantic coast to Nova Scotia (Kenney and Vigness-Raposa, 2010).

A dense aggregation of fin whale sightings occurs south of Montauk Point to south of Nantucket. This area is also a well-known feeding area for fin whales. Because of their regular occurrence in this area, a large number of whale-watching boats also frequent this area (Kenney and Vigness-Raposa, 2010). Their feeding grounds are located directly within the Project area. It is highly likely that fin whales will be encountered in the Project area.

North Atlantic Right Whale (*Eubalaena glacialis*)

North Atlantic right whale, a federally-listed endangered species, occurs within all the world's oceans from temperate to subpolar latitudes. The primary habitat for the North Atlantic right whale is coastal or continental shelf waters, ranging from calving grounds in southeastern United States to feeding grounds in New England (NOAA, 2017e; Hayes et al., 2017). There are seven areas in the western North Atlantic in which North Atlantic right whales aggregate seasonally. These include the coastal waters of the southeastern United States, the Great South Channel, Jordan Basin, Georges Basin along the northeastern edge of Georges Bank, Cape Cod and Massachusetts Bays, the Bay of Fundy, and the Roseway Basin on the Scotian Shelf. Acoustic surveys have demonstrated their presence year-round in the Gulf of Maine and off of New Jersey (Hayes et al., 2017). Important feeding habitats include coastal waters off Massachusetts, Georges Bank, Great South Channel, Gulf of Maine, Bay of Fundy, and the Scotian Shelf.

North Atlantic right whales are known to occur within the waters of Rhode Island and Massachusetts year-round. Kraus et al. (2016) reported a seasonal cluster of right whales south of Martha's Vineyard and east of Nantucket during the winter. Therefore, it is likely North Atlantic right whales are within the Project area.

Sperm Whale (*Physeter macrocephalus*)

Sperm whale, a federally-listed endangered species, can be found throughout the world's oceans. Sperm whales can be found near the edge of the ice pack in both hemispheres and also are common along the equator. Sperm whales of the North Atlantic are distributed mainly along the continental shelf-edge, over the continental slope, and mid-ocean regions, where they prefer water depths of about 1,000 meters (m). However, their distribution also extends shoreward, inshore of the 100-m contour (CETAP, 1982). Sightings have also been reported in waters as shallow at 60 m. Southern New England is one of the few locations in the world in which sperm whales frequent inshore areas (Kenney and Vigness-Raposa, 2010). Many reported sightings take place in a narrow band just south of Block Island, Martha's Vineyard, and Nantucket from May through November, in which the Project will intersect. This high occurrence of sperm whales is believed to be related to the presence of spawning squid (CETAP, 1982) and therefore, it is likely sperm whales will be encountered within the Project area.

Reptiles

Green Sea Turtle (*Chelonia mydas*)

Green sea turtle, a federally-listed threatened species, has a worldwide distribution and can be found in both tropical and subtropical waters (NaturesServe, 2017; NMFS and USFWS, 1991). In the western Atlantic Ocean, they can be found from Massachusetts to Texas, as well as in waters off Puerto Rico and the United States Virgin Islands (NMFS and USFWS, 1991). There are 11 listed distinct population segments (DPS) for green sea turtles, all of which are listed as threatened or endangered. The North Atlantic DPS was listed as threatened in 1978 (NMFS, 2017a).

Major green turtle nesting colonies occur on Ascension Island, Aves Island, Costa Rica, and Surinam. In the United States, green turtles nest in North Carolina, South Carolina, Georgia, Florida, the U.S. Virgin Islands, and Puerto Rico (USFWS, 2017b).

Critical habitat, which identifies specific areas that have physical or biological features essential to species conservation and/or might require special management considerations, was designated by NOAA fisheries for the green sea turtle in 1998. Critical habitat for green sea turtles includes the coastal waters of Culebra Island, Puerto Rico, and its outlying keys (USFWS, 2017b).

Green sea turtles are known to occur in northeast waters; however, the reported records of strandings are far less than the ones reported for species such as the Kemp's ridley turtles. From 1979 to 1986, only two stranded green turtles were recovered (Meylan and Sadove, 1986), and one was detected in the New York Offshore Planning Area (OPA) in the summer 2016 NYSERDA surveys (Normandeau Associates, Inc., 2016a, Normandeau Associates, Inc. 2016b), which encompasses the SFEC-NYS. During the winter of 1985 through 1987, five cold-stunned green turtles were collected along the shores of Long Island, New York. Though green turtles have been documented in New York State territorial waters, because of the infrequency of records and the wide distribution of these reports, it is not likely that these turtles will be encountered in the Project area.

Loggerhead Sea Turtle (*Caretta caretta*)

Loggerhead sea turtle, a federally-listed threatened species, has worldwide distribution and inhabit temperate and tropical waters, including estuaries and continental shelves of both hemispheres. Five populations of loggerhead sea turtles exist worldwide in the Atlantic Ocean, Pacific Ocean, Indian Ocean, Caribbean Sea, and Mediterranean Sea. In the western Atlantic Ocean, the five major nesting aggregations are: (1) a northern nesting aggregation from North Carolina to northeast Florida, approximately 20 degrees north latitude; (2) a south Florida nesting aggregation from 29 degrees north latitude on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting aggregation at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting aggregation on the eastern Yucatán Peninsula, Mexico; and (5) a Dry Tortugas nesting aggregation on the islands of the Dry Tortugas, near Key West, Florida (TEWG, 2000).

Loggerheads are commonly seen off the coast of New York State. The New York State Energy and Research Development Authority (NYSERDA) Digital Aerial Baseline surveys detected 395 loggerheads in the OPA in the summer 2016 surveys and six in the fall 2016 surveys (Normandeau Associates, Inc., 2016a, Normandeau Associates, Inc., 2016b). The Cetacean and Turtle Assessment Program (CETAP) conducted extensive aerial surveys from 1978 through 1982 along the coast from Cape Hatteras, North Carolina to Long Island, New York. Many loggerheads were sighted along the continental shelf waters between Cape Hatteras, North Carolina, and Long Island, New York. A high density of loggerheads was seen near the shore of central Long Island. Loggerheads show a northern limit at approximately 41 degrees north latitude (CETAP, 1982). Few sightings were reported past that northern limit (Shoop and Kenney, 1992). Loggerheads are most commonly seen in June then begin to decrease until

October (Shoop and Kenney, 1992). The turtles that fall behind may succumb to cold-stunning. This usually occurs during the fall when water temperatures begin to fall. In 1985, 56 cold-stunned turtles were stranded in eastern Long Island (Kenney and Vigness-Raposa, 2010). Loggerhead turtle occurrence within the Project area is therefore expected to be common.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

Kemp's ridley sea turtle, a federally-listed endangered species, is typically found off the coast of the Gulf of Mexico and along the Atlantic coast of the United States (TEWG, 2000). Juveniles inhabit the Atlantic Coast from Florida to the Canadian Maritime Provinces. In late autumn, Atlantic juveniles/sub adults travel northward to forage in the coastal waters of Georgia through New England and then return southward for the winter (NYSDEC, 2017b; Stacy, et al. 2013). Preferred habitats include sheltered areas along the coastline including estuaries, lagoons, and bays (NYSDEC, 2017b). The Kemp's ridley turtle is the most abundant turtle observed off the coast of Long Island, New York. The Long Island Sound has not been formally identified as critical habitat. However, research as inferred this area could potentially provide critical coastal developmental habitat for immature Kemp's ridley turtles during the early turtle life stages (two to five years) (NYSDEC, 2017b; Morreale et al., 1992). The main characteristics of developmental habitats are coastal areas sheltered from high winds and waves such as embayments, estuaries, and nearshore temperate waters that are shallower than 164 feet (50 m) (NMFS, 2017b).

Beginning in July, Kemp's ridley turtles begin inhabiting the Long Island Sound area. To date, all Kemp's Ridley turtles encountered in Long Island Sound have been juveniles. Between July and early October juveniles will occupy the estuarine waters of the Long Island Sound and Peconic Bay and the southern bays. During this time, growth rates will increase approximately 25% per month, indicating that these waters provide abundant source of food for these turtles. In October, the turtles will begin to migrate out of the estuaries and back into pelagic environments. Kemp's ridley turtles that do not migrate out by late November are likely to become cold-stunned. There are many records of cold stunned Kemp's Ridley turtles washing ashore on Long Island (Burke et al., 1993).

From 1986 to 1997, there was a total of 212 Kemp's ridley turtle strandings reported in the northeast United States. Most the turtles encountered were juveniles, ranging in size from approximately 22 to 37 cm (Morreale and Standora, 1998). Approximately 130 cold-stunned sea turtles were collected over a 3-year period along the shores of Long Island and the eastern bays of Long Island. Out of the 130 turtles collected, 77% were Kemp's Ridley turtle (Morreale et al., 1992). During the summer 2016 NYSERDA Digital Aerial Baseline Surveys, 18 Kemp's Ridley turtles were detected in the New York OPA. Only one Kemp's Ridley turtle was detected in the fall 2016 surveys (Normandeau Associates, Inc., 2016a, Normandeau Associates, Inc., 2016b). Kemp's ridley sea turtle encounters within the Project area are anticipated to be likely.

Leatherback Sea Turtle (*Dermochelys coriacea*)

Leatherback sea turtles, a federally-listed endangered species, are a primarily pelagic species found in both temperate and tropical waters globally. The leatherback is the largest, deepest diving, most migratory, widest ranging, and most pelagic of the sea turtles (NOAA, 2017g).

Leatherback strandings on U.S. shores are mostly of adult or near-adult size turtle (NMFS and USFWS, 1992). In relation to species occurrences, leatherback sightings generally are fewer in number when compared to loggerheads and Kemp's ridley. Leatherback distribution is similar to loggerheads with occurrences from Cape Hatteras to Long Island, but leatherbacks are more frequently observed in the Gulf of Maine, southwest of Nova Scotia, Canada. Boaters fishing within 10 miles (16 km) of the south shore of Long Island frequently report leatherback sightings (NMFS and USFWS, 1992). CETAP reported a small cluster with a high-mean relative density near the shore of central to eastern Long Island. In the NYSERDA Digital Aerial Baseline summer 2016 surveys, nine leatherback turtles were detected in the OPA. During the fall 2016, 28 leatherbacks were detected in the New York OPA (Normandeau Associates, Inc., 2016a, Normandeau Associates, Inc., 2016b). Leatherback occurrence within the Project area is therefore expected to be common.

Finfish

Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)*

The Atlantic sturgeon is listed as endangered under the ESA and is a large (up to 13 feet [four m] long), long-lived, anadromous fish that feeds on benthic invertebrates.

Atlantic sturgeon are found from Canada to Florida in estuarine habitats and rivers as well as in the coastal and shelf marine environments. Subadults move out to estuarine and coastal waters in the fall; and adults will inhabit fully marine environments and migrate through deep water when not spawning (ASSRT, 2007). The most recent status review for the Atlantic sturgeon was conducted in 2007. In this review, commercial bycatch was assessed and showed that the majority (61%) of tagged sturgeon recaptures came from ocean waters within 3.0 miles (4.8 km) of shore, with the lowest ocean bycatch occurring in the summer months (July to September) (ASSRT, 2007). Atlantic sturgeon occurring in the Project area are part of the New York Bight DPS. There is currently no population estimate for the New York Bight DPS of Atlantic sturgeon; however, the estimated Hudson River population is approximately 4,600 wild juveniles with a spawning stock of 870 adults. The Delaware River spawning stock is estimated at less than 300 adults. There is critical habitat designated for the New York Bight DPS within the Connecticut, Housatonic, Hudson and Delaware Rivers, but no offshore critical habitat designation.

The NMFS listed the New York Bight DPS as endangered in 2012 (77 FR 5880) with critical habitat designation finalized in 2017 (82 FR 3916). The IUCN lists the Atlantic sturgeon Near Threatened and the Convention on International Trade in Endangered Species of Wild Fauna and Flora lists the species under Appendix II, which lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Current threats to Atlantic Sturgeon within critical habitat include dams and turbines, dredging, water quality, and climate change.

Historically, this population of Atlantic sturgeon spawned in several rivers between Massachusetts and the Chesapeake Bay; currently, however, the New York Bight DPS is known to consistently spawn only within the Hudson and Delaware rivers between April and May and therefore, are likely to be encountered within the Project area (ASSRT, 2007).

Shortnose Sturgeon *(Acipenser brevirostrum)*

Like the Atlantic sturgeon, the shortnose sturgeon is listed as endangered under the ESA and much of the distribution information is the same for the two species which co-occur in habitats along the Atlantic coast. Individuals occurring in the Project area are from the Northeast spawning population encompassing the Connecticut, Hudson, and Delaware Rivers. Morphologically, the shortnose sturgeon is smaller overall with a less pronounced snout than other sturgeon species. In a 2010 Biological Assessment (Shortnose Sturgeon Status Review

Team, 2010) shortnose sturgeon were described as spending less time in open ocean habitats, and spawning farther upriver than Atlantic sturgeon. The Northeast shortnose sturgeon population uses freshwater habitat more than any of the other shortnose sturgeon populations (Kynard et al., 2016). They are considered more of an amphidromous species (defined as a species that spawns and remains in freshwater for most of its lifecycle but spends some time in saline water) rather than fully anadromous. Marine migrations do occur and individuals have been recorded traveling 140 km (87 miles) in six days when moving between rivers (Kynard et al., 2016). Because of the shortnose sturgeon proclivity to the freshwater and estuarine habitats, the potential for shortnose sturgeon to be present in the Project area is considered extremely unlikely.

4.11.1.2 Protected Marine Mammals

In addition to the listed species described above, other protected marine mammals that may be potentially located within or along the Project area were identified based on agency coordination and literature review. Table 4.11-2 – Summary of Marine Mammals Protected Under the MMPA Potentially Occurring Along or Within the Project lists the marine mammals that may potentially occur along the SFEC-NYS corridor.

Table 4.11-2 Summary of Marine Mammals Protected Under the MMPA Potentially Occurring Along or Within the Project

Scientific Name		Common Name	Potential Presence
Whale(s)	*Balaenoptera acutorostrata*	minke whale	Atlantic Ocean, Spring/Summer
Dolphin(s)	*Lagenorhynchus acutus*	Atlantic white-sided dolphin	Atlantic Ocean, Fall/Winter
	Tursiops truncatus	common bottlenose dolphin	Atlantic Ocean, Winter/Spring/Summer
	Delphinus delphis	short-beaked common dolphin	Atlantic Ocean, All-year
Porpoise(s)	*Phocoena phocoena*	harbor porpoise	Atlantic Ocean, All-year
Seals	*Phoca vitulina concolor*	harbor seal	Atlantic Ocean, All-year
	Halichoerus grypus	gray seal	Atlantic Ocean, Winter/Spring/Summer

4.11.1.3 Onshore Biological Resource Assessments

In order to identify the possible presence of the above-listed RTE species or their habitat along or within the Project area, onshore field surveys were conducted in vicinity of the Project. GPS technologies were utilized to record locations of RTE species and habitats observed during the onshore field surveys. In total, three occurrences were identified and delineated in the vicinity of the Project. Common tern (S*terna hirundo*), listed as threatened within New York State, were seen flying and foraging along the shoreline of the sea-to-shore transition corridor (see species description below). The remaining two RTE occurrences were a piping plover and a least tern nesting area, which was delineated to the west on the beach, outside of the sea-to-shore transition corridor. The piping plover and least tern nesting area was established by the Town of East Hampton Natural Resources Department and demarcated with string fencing and signage. No adult or juvenile piping plover or least tern were observed within or proximate to the nesting area. A summary of the findings from the onshore field surveys (see Appendix A) is shown in Table 4.11-3 – Summary of Onshore RTE Species Observed Along or Within the Project, below.

Table 4.11-3 Summary of Onshore RTE Species Observed Along or Within the Project

Observation ID[1]	Scientific Name	Common Name	Resource Map Page[a]	State (S)/ Federal (F) Listing	Comments
ES1	*Charadrius melodus*	piping plover	1	(F and S) Threatened	Nesting area (species not observed)
	Sternula antillarum	least tern		(S) Threatened	Nesting area (species not observed)
ES73	*Sterna hirundo*	common tern	1	NYS-Threatened	Two birds observed in flight/foraging

[a] Observation ID and Resource Map Page pertain to the figures within Appendix A.

4.11.1.4 Important Management Areas and Habitats

According to agency correspondence, field surveys, and literature review, various important management areas and habitats are located within the vicinity of the Project and have the potential to be impacted by Project construction. The important management areas that were assessed within the Project area are New York State Wildlife Management Areas, National Estuarine Research Reserves, IBA, Significant Coastal Fish and Wildlife Habitats (SCFWH), NYNHP Significant Natural Communities, and EFHs.

New York State Wildlife Management Areas - According to the NYSDEC there are no state Wildlife Management Areas in Suffolk County.

National Estuarine Research Reserves - According to the NOAA there are no National Estuarine Research Reserves in or near the Project area.

Important Bird Areas (IBA) - According to the National Audubon Society, SFEC-NYS crosses the Mecox Sagaponack Coastal Dunes IBA for less than 0.6 miles (1.0 km). The Mecox Sagaponack Coastal Dunes IBA is composed of coastal beaches, wetlands, undeveloped flats, sand bars, and an ocean inlet. Additionally, this IBA is an important breeding area for piping plover and least terns.

The Project is also within a mile (two km) of the Southampton Green Belt IPA.

Significant Coastal Fish and Wildlife Habitats (SCFWH) - The Project does not cross any of the NYSDOS-designated SCFWH as identified in the LWRP.

Within three miles (5 km) of the Project, there are three SCFWHs including the Long Pond Greenbelt (located west of the Project), the Sagaponack Inlet (located west of the Project), and the Atlantic Double Dunes (located east of the Project).

Additionally, no locally-designated SCFWHs are crossed by the Project. The two closest locally-designated SCFWHs are Georgica Pond and Wainscott Pond, as indicated by the LWRP.

NYNHP Significant Natural Communities - The NYNHP designates significant natural communities as “rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas” (NYNHP, 2017a). NYNHP monitors the “locations of significant natural communities because they serve as habitat for a wide range of plants and animals, both rare and common; and because natural communities in good condition provide ecological value and services. The conservation of high-quality examples of all the natural community types in each region of New York State will help ensure that all New York State’s plants and animals are preserved” (NYNHP, 2017b). Based on the NYNHP’s Biodiversity database, there is one significant natural communities crossed by the Project. The community is further described below:

Pitch Pine-Oak Forest - The Project crosses a Pitch Pine-Oak Forest significant natural community for 0.25 miles (0.40 km). The Pitch Pine-Oak Forest has a global rank of G4G5 which is defined as “apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery” and “demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery” (NYNHP, 2017e). Pitch Pine-Oak Forest has a state rank of S4, which is defined as “apparently secure in

New York State" (NYNHP, 2017e). A Pitch Pine-Oak Forest is "a mixed forest that typically occurs on well-drained, sandy soils of glacial outwash plains or moraines; it also occurs on thin, rocky soils of ridgetops. The dominant trees are pitch pine (*Pinus rigida*) mixed with one or more of the following oaks: scarlet oak (*Quercus coccinea*), white oak (*Q. alba*), red oak (*Q. rubra*), or black oak (*Q. velutina*)" (Edinger et. al, 2014).

During the onshore field surveys, Pitch Pine-Oak Forest was identified along the roadside of the SFEC-Onshore.

Additionally, Coastal Oak-Hickory Forest, Coastal Oak-Heath Forest, and Marine Intertidal Gravel/Sand Beach significant natural communities were also observed in the vicinity of the Project during field surveys. These three natural communities were not identified by NYNHP as being located along the SFEC-Onshore corridor, but were identified as significant natural communities in other locations in the Town of East Hampton. Coastal Oak-Hickory Forest is defined as a hardwood forest with both oaks (*Quercus spp.*) and hickories (*Carya spp.*). Coastal-Oak Hickory Forests occur "in dry, well-drained, loamy sand of knolls, upper slopes, or south-facing slopes of glacial moraines of the coastal plain. The forest is usually codominated by two or more species of oaks, usually white oak, black oak, and chestnut oak (*Q. montana*) " (Edinger et. al, 2014). A Coastal Oak-Heath Forest is defined as "a large patch to matrix hardwood forest of low diversity that typically occurs on dry, well-drained, sandy soils of glacial outwash plains or moraines of the coastal plain. The forest is usually codominated by two or more species of oaks: scarlet oak (*Quercus coccinea*), white oak and black oak" (Edinger et. al, 2014). The Marine Intertidal Gravel/Sand Beach significant natural community was observed within the sea-to-shore transition corridor. A Marine Intertidal Gravel/Sand Beach is defined as "a community washed by rough, high-energy waves, with sand or gravel substrates that are well-drained at low tide. These areas are subject to high fluctuations in salinity and moisture, but generally the sand is noticeably wetter than the adjacent maritime beach sand. A relatively low diversity community, it is perhaps best characterized by the benthic invertebrate fauna including polychaetes (*Spiophanes bombyx, Pygospio elegans*, *Clymenella torquata*, *Scoloplos fragilis*, *Nephtys incisa)*, amphipods (*Protohaustorius deichmannae, Acanthohaustorius millsi*), and mole crabs (*Emerita spp.*)" (Edinger et. al, 2014). Marine Intertidal Gravel/Sand Beaches are also known as feeding grounds for various shorebirds including the piping plover.

Essential Fish Habitat (EFH) -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 and shellfish habitats, known as EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA, 2017f). Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities. Necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers a species' full life cycle. According to NOAA, 28 EFH's have the potential to be located along or within the Project area. Table 4.11-4 - Summary of Specific Life Stage EFH Designations within New York State Territorial Waters, further describes the life stages of the species within EFH in the Project area. A detailed description of each of the fish identified as having an EFH within New York State territorial waters is included within Appendix I – Essential Fish Habitat Assessment.

Table 4.11-4 Summary of Specific Life Stage EFH Designations within New York State Territorial Waters

Species	Common Name	Eggs	Larvae	Juveniles	Adults
New England Finfish Species					
Clupea harengus	Atlantic sea herring			X	X
Melanogrammus aeglefinus	haddock		X		
Lophius americanus	monkfish	X	X		
Macrozoarces americanus	ocean pout	X	X		X
Urophycis chuss	red hake	X	X	X	
Merluccius bilinearis	whiting	X	X		
Scophthalmus aquosus	windowpane flounder	X	X	X	X
Pseudopleuronectes americanus	winter flounder	X	X	X	X
Glyptocephalus cynoglossus	witch flounder		X		
Limanda ferruginea	yellowtail flounder	X	X		
Mid-Atlantic Finfish Species					
Centropristis striata	black sea bass			X	
Pomatomus	bluefish			X	X

Species	Common Name	Eggs	Larvae	Juveniles	Adults
saltatrix					
Stenotomus chrysops	scup			X	X
Paralichthys dentatus	summer flounder				X
South Atlantic Finfish Species					
Rachycentron canadum	cobia[a]	X	X	X	X
Scomberomorus cavalla	king mackerel[a]	X	X	X	X
Scomberomorus maculatus	Spanish mackerel[a]	X	X	X	X
Invertebrates					
Loligo pealeii	longfin squid			X	X
Highly Migratory Species					
Thunnus thynnus	bluefin tuna			X	X
Katsuwonus pelamis	skipjack tuna				X
Skates					
Leucoraja erinacea	little skate			X	X
Sharks					
Prionace glauca	blue shark				X
Carcharhinus obscurus	dusky shark		X[b]	X	
Carcharias taurus	sand tiger shark		X[b]		
Carcharhinus plumbeus	sandbar shark		X[b]	X	X
Isurus oxyrinchus	shortfin mako shark			X	
Galeocerdo cuvieri	tiger shark		X[b]	X	
Carcharondon carcharias	white shark			X	

[a] Although cobia, king mackerel, and Spanish mackerel are identified as having EFH along the SFEC-NYS according to NOAA (2017h), the EFH habitat mapper (NOAA, 2017i) shows that these species do not have designated EFH within the SFEC-NYS. The NOAA Gloucester office (Tuxbury, 2017, pers. comm.) also confirmed that these three species do not have EFH in the SFEC-NYS. Therefore, EFH for these species is not evaluated further.

[b] These sharks give birth to live young; therefore, the "larvae" stage is more properly considered neonate or young-of-the-year.

4.11.2 Potential Important Habitat and Rare, Threatened, and Endangered Species Impacts and Proposed Mitigation

During the construction and operational phases of the Project, potential impacts to the aforementioned RTE species and habitats and important management areas are possible, but are anticipated to be minor to none, with the exception of vessel strikes to rare marine mammals (moderate impact, though not anticipated). The sections below describe the potential impacts and the mitigation techniques that will be utilized to minimize the construction and operational impacts of the Project to the extent practicable.

4.11.2.1 Potential Construction Impacts and Mitigation

Listed Species and Protected Marine Mammals

Onshore field surveys conducted for the Project indicated the presence of RTE species and/or potential habitat for these species. The majority of the onshore RTE species identified during agency consultations with the USFWS and the NYNHP as potentially being along or within the Project area were not observed during the field surveys. Correspondence with the NYNHP and literature reviews concluded that aquatic RTE species and MMPA-protected mammals have the potential to be located within the Project area.

Potential impacts to these species are described below by species group. Due to construction timeframes, construction techniques, and optimized routing of the Project, impacts to these species are anticipated to be minor to none.

Plants

Onshore construction of the Project is majorly confined to existing roadways, along the LIRR ROW, and adjacent to previously disturbed areas, minimizing the need for ground disturbance where potential RTE plants would be located. No RTE plant species were identified during field surveys and therefore, no impacts are anticipated.

Insects

Onshore construction of the Project is majorly confined to existing roadways, along the LIRR, and adjacent to previously disturbed areas. Minimal tree clearing is anticipated along the roadway portion of the SFEC-Onshore. Along the LIRR, scrub oak was sporadically observed, but none of the three ecological communities where scrub oak is a dominant species (Dwarf Pine Plains, Pitch Pine-Oak Heath Woodland, or Pitch Pine-Scrub Oak Barrens) were observed along the SFEC-Onshore. Additionally, NYNHP indicated that the coastal barren buckmoth has not been identified in the vicinity since 1983 and it was seen within a “pine oak barrens” ecological community. Due to the rarity of the species, the lack of ecological communities where the coastal barrens buckmoth lives, the sporadic amount of scrub oaks identified along the SFEC-Onshore, and the limited amount of tree clearing anticipated, impacts to the coastal barrens buckmoth are expected to be minor to negligible.

Birds

Listed bird species that could be affected by the Project include the piping plover, red knot, roseate tern, common tern and least tern. The breeding habitats of red knot, roseate tern, and common tern do not occur in Project construction areas. A piping plover and least tern nesting area was observed adjacent to the sea-to-shore transition corridor. Common terns were also observed in this same area; red knot and roseate tern were not observed. While common tern, roseate tern, and red knot do not breed in this area, these species may occur within the area or adjacent habitats for foraging or resting either during the breeding or migration periods. Disruption of beach habitat during construction will be minimized by the utilization of HDD, which will avoid impacts to the dunes, beach, and near-shore zone. An avian management plan for listed species will be prepared for the Project. Due to the mobility and rarity of each of the above-listed bird species and construction timing and techniques, impacts to RTE bird species is anticipated to be minor to negligible.

Mammals

The NLEB roosts and breeds in trees during their summer breeding season. Minimal tree clearing is anticipated along the SFEC-Onshore or at the SFEC-Interconnection Facility. Surveys conducted in this area of Long Island identified potential bat habitat only within the vicinity of the SFEC-Interconnection Facility. Due to limited tree clearing, negligible impacts to NLEBs are anticipated.

Humpback whale, fin whale, North Atlantic right whale, and sperm whale are listed species which have the potential to be located within the vicinity of the offshore portions of the SFEC-NYS. Additionally, minke whale, Atlantic white-sided dolphin, common bottlenose dolphin, short-beaked common dolphin, harbor porpoise, harbor seal, and gray seal are protected under the MMPA and also have the potential to be located within this same area. Potential impacts to each of these marine mammals are anticipated to be similar, and could be caused by underwater noise and vessel traffic, and discharges and debris during the construction of the Project.

Impacts resulting from discharges and debris are expected to be negligible. Accidental spill or release of oils or other hazardous materials will be managed through the Construction Contingency Plan to be included in the Project EM&CP. The Applicant will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.

Noise

The potential for noise to be generated during construction of the SFEC-NYS is the result of vessel use, including the DPV thrusters for cable installation and sheet pile cofferdam installation by vibratory hammer. Vibratory pile driving is expected to cause minor short-term direct effects, while the other sources of noise are expected to have negligible effects.

Underwater acoustic modeling was conducted to evaluate various Project-related construction sounds including use of DPV thrusters and vibratory pile driving (see Appendix E for further detail).

Noise generated by the nonimpulsive sound of the DPV thrusters during SFEC-NYS installation could cause short-term, minor to moderate behavioral impacts to marine mammals, depending on the distance from the sound. However, the likelihood of measurable impacts to marine mammals is low because SFEC-NYS installation will occur over a relatively short timeframe and depending on the time of year of installation, few marine mammals would be expected in the region. As the cable-laying operation enters SFEC-NYS waters, the likelihood of impact decreases with the lower occurrence of marine mammals in nearshore waters, with the possible exception of some dolphins, porpoises, and seals, which may be found closer to shore on a seasonal basis.

Noise generated by vibratory pile driving for the potential installation of the temporary cofferdam has the potential for direct effects on marine mammals. Duration of the temporary cofferdam installation is estimated to be short (approximately 12-24 hours). Direct effects associated with sound pressure waves and particle motion may include changes in behavior. These effects are expected to be short-term and negligible with marine mammals returning to the area after the noise-generating activity has been completed.

Traffic

Temporary vessel traffic also has the potential to affect marine mammals during Project construction.. Project-related vessel traffic will slightly increase vessel traffic within the Project area, but the number of vessels that operate for SFEC-NYS construction is expected to be a negligible addition to the normal traffic in the region. While vessel collisions with marine mammals are not uncommon, if they were to occur, they may result in animal injury and or death. Vessel strikes with marine mammals are most likely to occur with large whale species. Since three of the listed marine mammals in the Project area are large whale species, any collision has the potential to cause significant population level effects (Dolman et al. 2006).

Vessel strikes happen when either whales or vessels fail to detect one another in time to avoid the collision. Variables that contribute to the likelihood of a collision include vessel speed, vessel size and type, and visibility. Whales strikes have been reported at vessel speeds of 2-51 knots, and lethal or severe injuries most likely to occur at speeds of 14 knots or more (DOI MMS, 2007). Vessel types involved include Navy vessels, container and cargo ships, freighters, cruise ships, and ferries. Generally, the larger the vessel size (80 m or more [262 feet or more]) the more likely a collision will result in fatal or severe injuries (DOI MMS, 2007). Whale species that are most frequently involved in vessel collisions include fin whale, humpback whale, minke whale, Northern right whale, and sperm whale (Dolman et al. 2006). Smaller cetaceans and pinnipeds are also at risk of vessel strikes; however, these species tend to be more agile power simmers and are more capable of avoiding collisions with oncoming vessels (DOI-MMS, 2007).

The increase in construction related vessel traffic will be negligible when compared to other vessel operations within the area. The Applicant will require vessel strike avoidance measures to be followed that are based on NMFS's *Vessel Strike Avoidance Measures and Reporting for Mariners* (2008). Adherence to these provisions will further reduce the risk of associated vessel strikes or disturbance to marine RTE mammals that might result from the Project construction. It is not anticipated that the construction of the SFEC-NYS will cause a significant increase in frequency of vessel collisions to marine RTE mammals; therefore, impacts caused by construction vessels will be minor. However, due to low population estimates for the three RTE whale species that may occur in the area, any vessel collision would be detrimental to their population; therefore, impacts would be considered moderate (DOI MMS, 2007). In order to minimize potential vessel strikes, mitigation measures will be implemented to maximum extent practicable, including the use of NOAA-approved protected species observers, following NOAA guidelines for avoidance, and training personnel on marine mammal awareness. Based on these mitigation measures, impacts are anticipated to be short-term and negligible.

Entanglement of marine mammals can occur from the Project vessel traffic if lines, cables, or other tethered gear are placed in the water. However, since the only lines that will potentially be deployed would be steel anchor lines that will be under significant tension and temporarily used, it will be highly unlikely that marine mammals would become entangled. Therefore, the expected impact to marine mammals from entanglement will be negligible.

Reptiles

RTE reptiles that have the potential for impacts from Project construction include the Green Turtle, Loggerhead Turtle, Kemp's Ridley Turtle, and the Leatherback Turtle. Potential impacts to each of these species is anticipated to be similar to those described above for marine mammals.

Finfish

Atlantic sturgeon is the only RTE finfish species identified as having the potential to be located along or within the Project area. Potential impacts to Atlantic sturgeon could be caused by seabed disturbance, noise, sediment suspension and deposition, and discharges and releases/trash and debris. Section 4.9, *Finfish* above describes the potential impacts from Project construction on finfish, including Atlantic sturgeon, and anticipated mitigation measures.

Important Management Areas and Habitats

Impacts to important management areas and habitats are anticipated to be localized, limited, and a short-term disturbance. Noise, ground disturbance, and the presence of equipment have the potential to impact the management areas and habitats caused by HDD, cable duct bank installation, and substation construction.

The Mecox Sagaponack Coastal Dunes IBA impacts are anticipated to be negligible to minor due to the utilization of HDD from a potential cofferdam HDD exit point to the transition vault, located approximately 800 feet (244 m) from the MHWL. Additionally, construction activities at the sea-to-shore transition corridor will not be completed during the summer breeding season for piping plover, least tern, or common tern.

Impacts to the Pitch Pine-Oak Forest significant natural community are not anticipated because this significant natural community has only been identified along roadways and the SFEC-Onshore will be located within the paved roadways, wherever practicable. Impacts to Coastal

Oak-Hickory Forest and Coastal Oak-Heath Forest significant natural communities are anticipated to be minor due to communities only being observed in previously disturbed locations. The Marine Intertidal Gravel/Sand Beach significant natural community will not be disturbed due to the utilization of HDD at the sea-to-shore transition corridor.

Potential impacts to identified EFHs along the SFEC-NYS are anticipated to be the same as construction impacts to Finfish. Therefore, a detailed description of construction impacts to EFH is within Section 4.9, *Finfish.*

Proper erosion and sedimentation controls and BMPs will also be implemented prior to construction throughout the entire Project and monitored throughout the Project's construction duration. The Project EM&CP will include a SWPPP, which includes erosion and sediment control and BMP details to be approved by the NYSPSC staff prior to Project construction. Confining the SFEC-Onshore construction within existing ROWs (roads and the LIRR) will minimize the potential for impact to important management areas due to the locations already being previously disturbed. Ground disturbance will be kept to a minimum, resulting in negligible to minor impacts to important management areas and habitats.

4.11.2.2 Potential Operational Impacts and Mitigation

<u>Listed Species and Protected Marine Mammals</u>

Once construction is complete, any ground disturbance caused by the onshore construction, which will be located entirely below grade with the exception of the SFEC-Interconnection Facility, will be restored to pre-construction conditions. No maintenance is anticipated unless a fault or failure occurs due to damage from outside influences, such as unexpected digs from other parties. Therefore, negligible impacts to onshore RTE species or their habitat are anticipated during the operation of the Project.

Aquatic listed species and protected mammals identified as potentially occurring along or within the Project area may be impacted by Project operation. The three sections below further describe potential operational impacts to aquatic marine mammals, reptiles, and finfish. These impacts include vessel traffic, EMF, and discharges and releases. As described above for construction, impacts resulting from discharges and debris are expected to be negligible. Accidental spill or release of oils or other hazardous materials will be managed through the Construction

Contingency Plan to be included in the Project EM&CP. The Applicant will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.

Mammals

Potential impacts to marine mammals from Project O&M are possible from vessel traffic and EMF.

Vessel traffic impacts during O&M of the SFEC-NYS is anticipated to less than those identified in the construction phase of the SFEC-NYS because the volume of vessel traffic will be much less than the traffic experienced during construction, and will negligibly contribute to existing vessel traffic in the area. Vessel strike impacts during SFEC-NYS O&M are anticipated to be negligible. Mitigation measures during the operational and maintenance phase are anticipated to be similar to measures proposed for the construction phase.

Available evidence for marine mammals does not indicate that these species are capable of detecting the magnetic fields associated with the Project's AC cables. In particular, marine mammal surveys conducted at offshore windfarm sites indicate no adverse long-term impacts to these species. Appendix P has a more detailed discussion about the potential impacts of EMF on marine mammals. EMF is expected to be present near the cable, and marine mammals must surface to breathe. So, such behavior is expected to limit time spent near cables. Furthermore, the broad scale of marine mammal migrations and the generally low density of individuals within a given area are also expected to lower the likelihood that individuals will regularly encounter the cable route and Project-associated EMF. This broad distribution and movement means that the SFEC-NYS represents a small portion of the available habitat for migratory marine mammals.

Therefore, impacts to marine mammals relating to the EMF emitted from the SFEC-NYS will be negligible because of the low density of marine mammals in the water, their habit of surfacing for air, and the relatively narrow corridor occupied by the SFEC.

Reptiles

Potential operational impacts to sea turtles within the Project area include vessel traffic and EMF.

During normal operations, no vessel traffic along the SFEC-NYS is anticipated unless maintenance is required. Maintenance for the SFEC-NYS is not anticipated unless a fault or failure occurs due to damage from outside influences, such as boat anchors. Therefore, no operational impacts to sea turtles caused by vessel traffic are anticipated. The potential impacts of vessel traffic (collision or entanglement risk) on sea turtles will be less than those discussed for the Project construction because of the fewer anticipated vessels involved in SFEC-NYS construction. Mitigation measures during the operational and maintenance phase are anticipated to be similar to measures proposed for the construction phase.

Sea turtles possess the ability to detect two different features of the geomagnetic field including inclination angle and intensity (Lohmann and Lohmann, 1994). These fields vary across the earth's surface and sea turtles can derive positional information from these fields.

It is theorized that sea turtles utilize these fields in two different ways (1) as a magnetic compass, for directional sense that enables them to establish a heading and maintain their course and (2) for positional information, where turtles can approximate their position within the ocean (Lohmann and Lohmann, 1996). Multiple studies have demonstrated magnetosensitivty and behavioral responses to field intensities ranging from 0.0047 to 4000 microteslas (µT) and 29.3 to 200 µT for loggerhead sea turtles and green sea turtles, respectively (Normandeau et al. , 2011). The projected EMFs emitted from the SFEC-NYS are described in Appendix P. When comparing the projected EMFs with the magnetosensitivty of sea turtles, data suggests that sea turtles are capable of sensing the EMFs emitted from undersea cables.

Despite the potential for sea turtle orientation to be impacted by specific magnetic fields, available evidence for sea turtles does not indicate that these species are capable of detecting the magnetic fields associated with the Project's transmission cables. Luschi et al. (1996) placed magnets on the head of sea turtles to mask the earth's magnetic fields from the sea turtles. Results showed that sea turtles with the magnets were still capable of returning home; however, their routes were less direct than the control (Normandeau et al., 2011; Luschi et al., 1996).

Sea turtles could encounter EMF from the SFEC-NYS cable if feeding on benthic organisms in the sediment surface above the cable. Because these species must surface to breathe, such behavior is expected to limit time spent near cables. Furthermore, the broad scale of sea turtle migrations and the generally low density of individuals within a given area are also expected to lower the likelihood that individuals will regularly encounter the cable route and Project-associated EMF. This broad distribution and movement means that the SFEC-NYS corridor represents a very small portion of the available habitat for migratory sea turtles. The impact of EMF on sea turtles during O&M is anticipated to be negligible.

Finfish

Operational impacts to Atlantic sturgeon are anticipated to be minor to none. Further details describing the operational impacts of the SFEC-NYS on finfish, including Atlantic sturgeon, and anticipated mitigation measures are included within, Section 4.9, *Finfish*.

Important Management Areas and Habitats

Similar to the onshore RTE species, once construction is complete no impacts are anticipated to onshore important management areas or habitats. All disturbance caused by construction will be restored to pre-construction conditions. No maintenance is anticipated unless a fault or failure occurs due to damage from outside influences, such as unexpected digs from other parties.

4.12 Noise

This section presents the noise impact assessment for the Project, including background information on sound level concepts, applicable federal, state, and local regulations and standards used to evaluate noise, existing ambient noise conditions in the study area, methodology for predicting noise from construction and operation of the Project, results of the noise impact assessment, and proposed mitigation measures, as needed, to minimize potential noise effects. Additional information is available in the Sound Study Technical Report, the Under Water Acoustic Modeling of Construction Noise, and the In-Air Noise Evaluation Memo (see Appendix E). This section focuses on the potential effects of onshore noise. Information on the potential effects of offshore noise and specific details of potential noise effects on marine organisms is discussed in Sections 4.9, *Finfish*, 4.10, *Benthic and Shellfish Resources,* and 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*.

Sound is the rapid fluctuations of air pressure above and below ambient pressure levels. Noise is defined as unwanted or excessive sound, whether underwater or in air. Sound becomes a potentially adverse impact when it interferes with the normal habits or activities of people (such as sleep, work, communication, or recreation), fish or wildlife. Recognition or perception of sound depends on many factors including the sound source, frequency, distance between source and reception, hearing capabilities and various environmental factors. How people perceive sound depends on several measurable physical characteristics including:

Sound Level - Sound level is based on the amplitude change in pressure and is related to the loudness or intensity. Human hearing covers a wide range of changes in sound pressure amplitude. Therefore, sound levels are most often measured on a logarithmic scale of dB relative to 20 micro-pascals. The dB scale compresses the audible range of acoustic pressure levels, which can vary from the threshold of hearing (0 dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. For example, adding two equal sound levels results is a three dB increase in the overall level. Research indicates the general relationships between sound level and human perception are as follows:

- A three dB increase is a doubling of acoustic energy and is approximately the smallest difference in sound level that can be perceived in most environments.
- A ten dB increase is a tenfold increase in acoustic energy and is generally perceived as a doubling in loudness to the average person.

Frequency - Sounds are comprised of acoustic energy distributed over a range of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hz. Human hearing generally ranges from 20 to 20,000 Hz; however, the human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as A-weighting is commonly used to evaluate environmental noise levels and sound levels, denoted as “dBA”.

- Sound levels reported in octave or one-third-octave frequency bands are often used to describe the frequency content of different sounds. Some sources of sound can generate “pure tones” which is when there is a concentration of sound within a narrow frequency range, such as a whistle. Humans can hear pure tones very well and such conditions can be a cause of increased annoyance.

A variety of sound level descriptors can be used for environmental noise analyses. These descriptors relate to the way sound varies in level over time. The following is a list of common sound level descriptors:

Energy-Average Sound Level (Leq) is a single value that represents the same acoustic energy as the fluctuating levels that exist over a given period of time. The Leq takes into account how loud noise events are during the period, how long they last, and how many times they occur. Leq is commonly used to describe environmental noise and relates well to human annoyance. An Leq over an eight hour period is commonly used to evaluate construction noise and is denoted Leq[8hr].

Day-night Average Sound Level (Ldn) is similar to the Leq in that it is a single value, which represents the same acoustic energy as the fluctuating levels that exist over a 24 hour period. The Ldn takes into account how loud sound events are, how long they last, how many times they occur over a 24 hour period, and whether they occur during the day (7:00 AM to 10:00 PM) or night (10:00 PM to 7:00 AM). Sound that occurs during the night is given a ten dB penalty to account for the increased human sensitivity to noise at night. If sound levels are constant over a 24 hour period, the Ldn level is 6.4 dB greater than the Leq level due to the ten dB nighttime penalty.

Statistical Sound Levels – Sound level metrics, such as L01, L10, L50 or L90, represent the levels that are exceeded for a particular percentage of time over a given period. For example, L10 is the level which is exceeded ten percent of the time. Therefore, it represents the higher end of the range of sound levels. The L90, on the other hand, is the level that is exceeded 90 percent of the time and therefore, is representative of the background sound level.

Maximum Sound Level (Lmax) – Many sources of sound, including mobile sources and stationary sources, change over time. Stationary sources associated with energy facilities can often generate different sound levels depending on the operational condition of the equipment. It is common to describe sound in terms of the maximum (Lmax) sound level emissions. Table 4.12-1 – Maximum Sound Levels of Common Outdoor and Indoor Sources presents a list of the maximum sound levels of common outdoor and indoor sources.

Table 4.12-1 Maximum Sound Levels of Common Outdoor and Indoor Sources

Outdoor Source	Sound Level (dBA)	Indoor Source
	110	Rock Band at five m
Jet Over Flight at 300 m	105	
	100	Inside New York Subway Train
Gas Lawn Mower at one m	95	

Outdoor Source	Sound Level (dBA)	Indoor Source
	90	Food Blender at one m
Diesel Truck at 15 m	85	
Noisy Urban Area—Daytime	80	Garbage Disposal at one m
	75	Shouting at one m
Gas Lawn Mower at 30 m	70	Vacuum Cleaner at three m
Suburban Commercial Area	65	Normal Speech at one m
	60	
Quiet Urban Area—Daytime	55	Quiet Conversation at one m
	50	Dishwasher Next Room
Quiet Urban Area—Nighttime	45	
	40	Empty Theater or Library
Quiet Suburb—Nighttime	35	
	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime	25	Empty Concert Hall
Rustling Leaves	20	
	15	Broadcast and Recording Studios
	10	
	5	
Reference Pressure Level	0	Threshold of Hearing

Source: FHWA, 1980.

4.12.1 Noise Standards and Guidelines

This section describes the federal, state, and local noise policies, guidelines, and ordinances applicable to the Project. Table 4.12-2 – Summary of Applicable Noise Standards summarizes the jurisdiction, agency, standard, and operational and construction noise limits.

Table 4.12-2 Summary of Applicable Noise Standards

Jurisdiction	Agency	Standard	Operational Noise Limit (dBA)	Construction Noise Limit (dBA)
Federal	USEPA	Information on the Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety [a]	55 dBA (Ldn) 48.6 dBA (Continuous Leq)	N/A
New York State	NYSDEC	Assessing and Mitigating Noise Impacts [b]	Ambient + 6 dBA (Leq)	65 dBA (Leq) or Ambient + 10 dBA if greater than 65 dBA (Leq)
Town of East Hampton		Chapter 185: Noise Town Code	65 dBA (Leq) 7 AM – 7 PM 50 dBA (Leq) 7 PM – 7 AM with Octave Band Limits	No sound limit 7 AM – 8:30 PM 50 dBA (Leq) 8:30 PM – 7 AM

Sources: [a]USEPA, 1974 and [b]NYSDEC, 2001

4.12.1.1 Federal Noise Guideline

The USEPA has conducted a study on noise impacts relative to public health and safety which provides guidance on the potential effects of noise (USEPA, 1974). As shown in Table 4.12-3 – USEPA Noise Levels Identified to Protect Public Health and Welfare, the USEPA study concluded that a sound level of 55 dBA (Ldn) or less for outdoor residential areas, or 55 dBA (Leq[24]) or less for outdoor areas where people spend limited amounts of time, such as schools and playgrounds, will protect public health and welfare in regards to potential interference with outdoor activity and annoyance. The study also concluded that a sound level of 45 dBA (Ldn) or (Leq[24]) or less for indoor residential uses and schools, respectively, will protect public health and welfare in regard to potential interference and annoyance. The USEPA noise guidelines are based on the evaluation of pervasive long-term noise, and therefore, are applied to future operational noise conditions and are not typically applied to short-term construction-period activities.

Table 4.12-3 USEPA Noise Levels Identified to Protect Public Health and Welfare

Effect	Level	Area
Outdoor Activity Interference	LDN [55 dBA]	Outdoors in residential areas and farms, other outdoor areas where people spend widely varying amounts of time
	LEQ(24) [55 dBA]	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, parks, etc.
Indoor Activity Interference and Annoyance	LDN [45 dBA]	Indoor residential areas
	LEQ(24) [45 dBA]	Other areas with human activities, such as schools

Source: USEPA, 1974

4.12.1.2 NYSDEC Noise Policy

The NYSDEC program policy provides guidance on the methods to assess potential noise impacts and avoid or reduce adverse impacts (NYSDEC, 2001). The NYSDEC policy addresses noise assessments and mitigation for both construction and operation of a proposed project.

As shown in Table 4.12-4 – NYSDEC Guidelines for Assessing Operational Noise Impact and Mitigation, the NYSDEC policy includes guidelines for assessing noise impacts and mitigation. If a project will increase noise by three dB or less, there will be a minor effect in future noise conditions and there is no need for mitigation. Changes in noise less than three dB are typically considered to be imperceptible in most environments. If a project will increase ambient noise levels by three to six dBA, there is potential for adverse noise impact for the most sensitive receptors, and there may be a need for mitigation. For increases in noise of six to ten dBA, there is a greater potential for impact, and mitigation is generally needed. For increases in ambient noise of ten dBA or more, mitigation is warranted where reasonable.

When a noise study indicates that the proposed action may result in significant impact, the NYSDEC requires the applicant to implement reasonable and necessary measures to mitigate or eliminate the adverse effects. If a significant adverse impact is identified, in addition to physical mitigation measures, such as reducing sound at the source or installing noise barriers, an applicant should also consider BMPs to reduce noise by means of modifying noise-generating equipment, limiting the time of noisy operations, or relocating noise sources farther away from receptors.

Since construction activities are short-term in relation to operational noise, separate thresholds are generally used to assess construction noise. According to the NYSDEC policy, a proposed action should generally not raise ambient sound levels above 65 dBA in non-industrial settings or above 79 dBA in industrial environments. Therefore, given the temporary nature of construction noise, an increase in ambient noise of ten dBA or more that will increase levels above 65 dBA is considered a reasonable construction noise threshold. Beyond these levels, it is recommended that BMPs be used to minimize the effects of construction noise.

Table 4.12-4 NYSDEC Guidelines for Assessing Operational Noise Impact and Mitigation

Sound Level Increase (dBA)	Impact Determination	Need for Mitigation
0–3	No impact	None
3–6	Potential adverse impact for the most sensitive receptors	Mitigation may be needed for the most sensitive receptors
6–10	Potential adverse impact depending on existing sound level and character of land use	Mitigation is generally needed for most residential receptors
Ten or more	Adverse impact	Mitigation is warranted where reasonable

Source: NYSDEC, 2001.

4.12.1.3 Local Noise Ordinance

The Town of East Hampton code's noise chapter prohibits the operation of any source of noise that permits the condition of noise pollution, whereby noise pollution is defined as noise that is necessary to cause temporary or permanent hearing loss, be injurious to public health, cause a nuisance, or exceed noise limits, as summarized in Table 4.12-5 – Town of East Hampton Town

Code Noise Chapter. This local noise code applies to long-term operational and short-term construction-period activities. Construction noise is exempt from the noise level limits between 7:00 AM and 8:30 PM on any day. The ordinance prohibits operational noise from generating an overall level of 65 dBA between the hours of 7:00 AM and 7:00 PM when measured on the property line of a residential district and 70 dBA when measured in a commercial or industrial district. During nighttime hours, operational noise between 7:00 PM to 7:00 AM and construction noise between 8:30 PM and 7:00 AM is limited to 50 dBA for residential districts and 55 dBA for commercial or industrial districts.

Table 4.12-5 Town of East Hampton Town Code Noise Chapter

Receiving Property Category	Daytime Noise Limit (dBA) (7 AM –7 PM)	Nighttime Noise Limit (dBA) (7 PM – 7 AM)
Residential	65	50
Commercial	70	55
Industrial	70	55

Source: Town of East Hampton code noise chapter, adopted June 7, 1985

The Town of East Hampton noise code also includes octave-band limits which limit noise in different frequency bands (i.e. high-pitched or low-pitched sounds). These octave band limits are presented in Table 4.12-6 – Town of East Hampton Overall and Octave Band Noise Limits.

Table 4.12-6 Town of East Hampton Overall and Octave Band Noise Limits

Location	Measurement Period	Overall (Leq, dBA)	Octave-Band Sound Pressure Level (Leq, dB)								
			31.5	63	125	250	500	1000	2000	4000	8000
Residential Receptor	Day 7 AM – 7 PM	65	78	73	67	60	55	51	46	43	40
Residential Receptor	Night 7 PM – 7 AM	50	75	70	64	57	52	49	43	40	37
Commercial Receptor	Day 7 AM – 7 PM	70	85	80	74	67	62	58	53	50	47
Commercial Receptor	Night 7 PM – 7 AM	55	78	73	67	60	55	51	46	43	40

Source: Town of East Hampton, New York.

4.12.2 Existing Noise Conditions

Existing noise conditions have been measured at the SFEC-Interconnection Facility and in the vicinity of the sea-to-shore transition at Beach Lane to evaluate operational, daytime construction, and nighttime construction noise. Existing ambient sound levels along the SFEC-Onshore corridor have been estimated based on the methodology described in the Federal Transit

Administration (FTA) guidance manual which is based on population density and the proximity of receptor locations to transportation sources, such as major roads and railroads (FTA, 2006).

Noise-sensitive receptors throughout the study area include single-family residences on Beach Lane, Wainscott Main Street, Sayre's Path, Wainscott Stone Road, Wainscott Northwest Road, and adjacent to the LIRR ROW. The Child Development Center of the Hamptons school is also approximately 200 feet (61 m) from the LIRR ROW.

4.12.2.1 Ambient Sound Measurement Results

The following section describes the specific ambient sound measurement methods and results for the SFEC-Interconnection Facility, the sea-to-shore transition, and the SFEC-Onshore study area. The ambient sound measurements were conducted with Larson Davis Model LxT and 831 sound level meters, which meet American National Standards Institute Type 1 accuracy. Weather conditions during all the measurements were suitable for collecting data without substantial influence on the results. See the Sound Study Technical Report (Appendix E) for further details on the measurement equipment and weather conditions.

SFEC-Interconnection Facility Measurement Results

As shown in Figure 4.12-1 – SFEC-Interconnection Facility Measurement and Receptor Locations, long-term (24 hour) ambient measurements were conducted at two locations (LT-1 and LT-2) from December 11 to 12, 2017 and short-term (20 minute) late-night ambient measurements were conducted at five locations (ST-1 to ST-5) on February 1, 2018.

The data were analyzed to identify LIRR train events and to exclude these transient events from the sound level results. This is a conservative approach to evaluating ambient sound conditions and the potential for construction or operational noise to affect receptors. Overall daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) energy-average Leq and statistical sound levels were determined at the long-term measurement locations. The short-term measurements were all conducted during the late-night period (approximately 1:00 to 3:00 AM) when ambient conditions are typically quietest and did not include train events.

Table 4.12-7 – Ambient Sound Measurement Results at SFEC-Interconnection Facility presents the overall A-weighted (dBA) and un-weighted (dB) octave-band energy-average sound levels

(Leq). Existing nighttime ambient sound levels range from 37.3 to 42.2 dBA (Leq). Daytime ambient sound levels range from 45.8 to 47.5 dBA (Leq).

Table 4.12-7 Ambient Sound Measurement Results at SFEC-Interconnection Facility

Location	Measurement Period	Overall[a] (Leq, dBA)	Octave-Band Sound Pressure Level (Leq, dB)								
			31.5	63	125	250	500	1000	2000	4000	8000
LT-1: Near 24 Horseshoe Drive	Night (10PM – 7AM)	37.5	39.5	46.6	43.3	40.4	36.0	31.2	22.1	19.3	16.7
	Day (7AM – 10PM)	45.8	56.6	53.6	46.2	46.0	43.6	41.2	35.5	32.0	27.4
LT-2: Near Cove Hollow Road	Night (10PM – 7AM)	37.3	39.5	45.9	43.0	39.1	36.2	31.3	22.7	20.3	19.1
	Day (7AM – 10PM)	47.5	55.2	54.5	48.2	45.2	44.5	43.3	39.4	34.6	29.4
ST-1: Surrey Court (Cul-de-sac)	1:10 – 1:30 AM	42.2	58.9	53.1	44.2	42.1	39.3	36.1	33.8	30.8	26.6
ST-2: 5 Hardscrabble Court	1:40 – 2:00 AM	39.8	52.1	48.3	40.2	39.9	36.7	34.4	30.9	28.9	25.1
ST-3: Existing East Hampton Substation Access Road	2:10 – 2:30 AM	39.0	49.2	45.6	40.3	38.3	36.3	32.8	30.3	29.6	26.0
ST-4: Cove Hollow Road and Buell Lane	2:35 – 2:55 AM	38.9	49.1	44.2	39.4	37.1	35.3	33.5	30.3	29.0	25.7
ST-5: Near 19 Horseshoe Drive	3:10 – 3:30 AM	38.5	53.2	46.1	39.6	40.5	36.6	31.5	27.6	25.2	20.1

[a] Ambient noise measurement results exclude LIRR train operations. Noise measurements at LT-1 and LT-2 conducted from December 11-12, 2017. Noise measurements at ST-2 to ST-5 conducted on February 1, 2018.

Source: VHB, 2017 and 2018 (see Appendix E).

Sea-to-Shore Transition Measurement Results

As shown in Figure 4.12-2 – Sea-to-Shore Transition HDD Construction, short-term (20 minute) ambient measurements were conducted at two locations (ST-1 & ST-2), on January 31, 2018 to February 1, 2018. The measurements were conducted during the morning (8:00 to 9:00 AM), evening (5:00 to 6:00 PM), and nighttime (12:00 to 1:00 AM).

Table 4.12-8 – Ambient Sound Measurement Results at the Sea-to-Shore Transition presents the overall A-weighted (dBA) and un-weighted (dB) octave-band energy-average sound levels (Leq) at the sea-to-shore transition where HDD will occur. The predominant source of noise was ocean waves on the shoreline. Existing ambient sound levels during the day and night ranged from 51 to 59 dBA (Leq).

Table 4.12-8 Ambient Sound Measurement Results at the Sea-to-Shore Transition

Location	Measurement Period	Overall (Leq, dBA)	Octave-Band Sound Pressure Level (Leq, dB)								
			31.5	63	125	250	500	1000	2000	4000	8000
Beach Lane Site 1	Morning (7:50 – 8:10 AM)	58.6	68.0	63.1	56.6	55.6	55.4	53.6	50.0	43.4	33.1
	Evening (5:10 – 5:30 PM)	51.8	60.1	57.5	51.0	48.1	49.6	47.6	43.7	36.2	28.3
	Night (12:00 – 12:20 AM)	54.2	64.7	60.0	55.2	51.0	51.7	50.4	45.5	36.6	25.6
Beach Lane Site 2	Morning (8:15 – 8:35 AM)	57.5	64.1	60.1	54.7	53.7	57.7	51.4	47.8	40.8	32.6
	Evening (5:40 – 6:00 PM)	55.5	62.0	61.0	61.8	51.6	51.7	50.6	48.6	40.9	32.0
	Night (12:25 – 12:45 AM)	51.4	66.5	58.3	51.7	50.1	49.5	47.0	42.8	34.2	25.3

Source, VHB, 2018.

See the Sound Study Technical Report (Appendix E) for further information on the ambient sound measurement results.

SFEC-Onshore Corridor Ambient Sound Level Estimates

Existing sources of sound along the SFEC-Onshore corridor include natural ambient sources such as wind through the trees, local traffic on the roadways and train operations on the LIRR tracks. Ambient sound levels have been estimated, rather than measured, along the corridor since operational and nighttime construction noise evaluations are not needed and the daytime construction noise assessment only depends on existing conditions if the existing noise levels exceed 65 dBA (Leq), per NYSDEC criteria.

Existing ambient sound levels along the SFEC-Onshore corridor have been estimated based on the methodology described in the FTA guidance manual which is based on population density and the proximity of receptor locations to transportation sources, such as major roads and railroads (FTA, 2006). For receptors adjacent to roadways on the SFEC-Onshore corridor, existing sound levels are estimated to be 40 dBA (Leq) during the daytime and 35 dBA (Leq) during the evening based on a population density of approximately 285 people per square mile. The closest receptors along the LIRR tracks on the SFEC-Onshore corridor are approximately 150 feet to 250 feet (46 m to 76 m) from the tracks. Ambient sound levels are estimated to be 60 dBA (Leq) during the day and 55 dBA (Leq) during the evening based on a proximity to the track.

Since existing ambient sound levels along the SFEC-Onshore corridor are estimated to be below 65 dBA (Leq), the NYSDEC daytime construction noise limit is 65 dBA (Leq).

4.12.3 Noise Assessment

This section presents the results of the sound predictions and the impact assessment for construction and operation of the SFEC-Interconnection Facility, and construction of the sea-to-shore transition and SFEC-Onshore. Because there is no permanent noise-generating equipment associated with the SFEC-Onshore or the sea-to-shore transition, operational noise has not been evaluated.

The methodology used to assess potential effects of sound from the construction of the SFEC-Onshore, the sea-to-shore transition, and the SFEC-Interconnection Facility and the operational noise of the SFEC-Interconnection Facility includes the following: identifying noise-sensitive receptors in the study area; characterizing the existing ambient sound environment with measurements and modeling; predicting future sound emissions from the construction and operation of the Project; assessing potential impact; and evaluating the need for mitigation or BMPs.

Construction noise has been modeled using standard methods for energy and transmission line projects in a manner that is consistent with federal guidelines. The construction noise model accounts for the types of construction equipment, the number of each type of equipment, the amount of time they typically operate during a work period (usage factor), and the distance between receptor locations and the equipment. Noise emissions of construction equipment is based on reference data from the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) and other Project-specific equipment specifications. For stationary construction, including HDD and construction at the SFEC-Interconnection Facility, Cadna-A has been used to predict sound at nearby receptor locations. For construction of the SFEC-Onshore, which moves linearly along public road ROWs and the LIRR ROW, the FHWA RCNM model is used to predict construction noise levels. The model provides sound level versus distance results, which are then applied along the corridor.

Operational sound from the SFEC-Interconnection Facility has been predicted using Cadna-A sound prediction software. Cadna-A is an internationally-accepted sound prediction program that implements the International Standards Organization 9613-2 sound propagation standard. This model takes into account the sound emissions of equipment, the ground cover, terrain, and intervening objects such as buildings. See Section 4.12.3.2, *Operational Noise Assessment* for information on sound emissions of the equipment.

Potential operational and construction noise impacts have been assessed according to applicable criteria and guidelines, and mitigation or BMPs have been evaluated.

See Sound Study Technical Report for further information on the onshore noise assessment methodology (Appendix E).

4.12.3.1 Construction Noise Assessment

Construction noise has been predicted at the SFEC-Interconnection Facility, the sea-to-shore transition, and along the SFEC-Onshore corridor.

SFEC-Interconnection Facility Construction

Construction of the SFEC-Interconnection Facility will take approximately six to nine months, will occur during daytime hours, and will include the following activities:

- Site preparation, excavation, and grading (this is typically the loudest phase of substation construction);
- Construction of foundations for the control building, transformer, reactors, and switchgear;
- Construction of electrical grounding, duct banks, and underground conduits;
- Installation of appropriate drainage systems and station service including electrical and water; and
- Installation of all above ground structures including transformer, switchgear, and cable systems.

Figure 4.12-3 – SFEC-Interconnection Facility Construction shows the highest construction noise levels at the nearest property line. Construction noise levels at the nearest property line will be 58 dBA (Leq[8h]). Since SFEC-Interconnection Facility construction will occur during the daytime, it will meet all applicable construction noise criteria. Therefore, BMPs to reduce noise are not warranted for construction of the SFEC-Interconnection Facility.

See the Sound Study Technical Report (Appendix E, Table 14) for further detail on SFEC-Interconnection Facility construction including noise levels at specific receptor locations.

Sea-to-Shore Transition Construction

The work area along Beach Lane for the sea-to-shore transition will accommodate an HDD rig, mud pumps, generators, de-silter, backhoe, crane, a pickup truck and other equipment to facilitate the construction of the Project. The HDD installation activities are expected to take ten to 12 weeks. HDD activities will be completed outside the summer season. Construction at the sea-to-shore transition will also include site preparation and excavation for the vault. The loudest phase of construction at Beach Lane will be HDD activities.

As shown in Figure 4.12-2, the highest noise levels at nearby residential buildings will be less than 50 dBA (Leq[8h]). Construction noise at the closest locations on residential properties in yard areas near the road will be between 50 and 55 dBA (Leq[8h]). As described in Section 4.12.2.1, *Ambient Sound Measurement Results*, existing ambient sound levels ranged from 51 to 59 dBA (Leq) during the day and night. Therefore, construction noise will generally be below existing ambient sound levels and below all applicable construction noise criteria. Since HDD construction will be below all applicable daytime and nighttime noise criteria, mitigation, or additional BMPs to further attenuate construction noise is not warranted.

Continuous HDD operations are typically needed to minimize potential soil settlement and equipment failures, therefore, HDD operations may occur during the nighttime period. Based on the fact that HDD construction sound will be below existing ambient sound levels and will be planned outside the summer months, there will be minor effects from continuous HDD construction.

See the Sound Study Technical Report (Appendix E, Table 12) for further detail including the HDD construction noise levels for the sea-to-shore transition at 20 of the nearest receptors.

SFEC-Onshore Construction

Underground cable construction typically includes concrete saws, jackhammers, or hoe rams to remove existing pavement and small backhoes, trenchers, and dump trucks to install the cable and replace the paved surface. SFEC-Onshore cable installation is expected to take approximately nine to 12 months and will occur during daytime hours.

Construction will generate noise of approximately 90 dBA (Leq[8h]) at a distance of 50 feet (15 m) from the center of construction activities. At a distance of 200 feet (61 m), construction noise will be 65 dBA (Leq[8h]). Therefore, construction noise will approach or exceed 65 dBA (Leq[8h]) at most first-row receptors immediately adjacent to the road or railroad ROWs.

SFEC-Onshore construction will occur during the day and will meet the Town of East Hampton noise code. Since the SFEC-Onshore construction proceeds linearly along the route throughout construction, construction will occur for relatively brief periods of time near any particular receptor location.

See the Sound Study Technical Report (Appendix E, Table 13 and Figure 3) for further detail on the construction noise predictions.

4.12.3.2 Operational Noise Assessment

Operational noise has been predicted at the SFEC-Interconnection Facility. There is no permanent noise-generating equipment associated with the SFEC-Onshore or the sea-to-shore transition, so operational noise has not been evaluated.

SFEC-Interconnection Facility Equipment Assumptions

The SFEC-Interconnection Facility will introduce new sources of sound including transformers, oil-cooled reactors, and heating, ventilation, and air-conditioning equipment associated with the control house. Specifically, the SFEC-Interconnection Facility is assumed to include the following sound-generating equipment:

- Two high-voltage substation transformers rated for 138 kV and 108 Mega-Volt-Amperes (MVA).
- Two Oil-cooled reactors rated for 35 Mega-Volt-Amperes-Reactive (MVAr).
- Control house with exterior heating, ventilation, and air-conditioning equipment.

At this phase of the SFEC-Interconnection Facility design, specific manufacturers and models of equipment have not been finalized. The National Electrical Manufacturers Association (NEMA) has reference data available on sound emissions for different sizes of transformers and reactors, although these sound levels are typically higher than actual equipment emissions (NEMA, 2014). Actual equipment sound emissions are typically based on measurements conducted in accordance with standard procedures such as the Institute of Electrical and Electronics Engineers (IEEE) “Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers” (IEEE, 1999). Actual sound emissions based on measurements are then documented in manufacturer specifications and are commonly procured assuming the noise will meet “guaranteed levels.”

To minimize potential noise effects from the SFEC-Interconnection Facility, low-noise equipment will be used, and an 11.5-foot (3.5 m) solid perimeter sound wall will be included. Sound from the SFEC-Interconnection Facility has been evaluated based on the following assumptions:

- The transformers will generate energy-average sound levels of 62 dBA at a distance of two m from the exterior walls of the transformer. This sound rating is based on the NEMA methodology for determining sound emissions from transformers that have air-forced cooling (fans). These sound emissions are 20 dB below the standard NEMA ratings for 108 MVA/650 kV transformers. Ultra-low noise transformers have been shown to achieve sound emissions that are 20 dB below the NEMA standard rating.
- Each oil-cooled reactor will generate energy-average sound levels of 57 dBA at a distance of one feet (0.3 m) from the exterior walls of the reactor. This sound rating is based on the NEMA methodology for rating sound emissions from reactors that do not have air-forced cooling (fans). These sound emissions are 20 dB below the NEMA ratings for 35 MVAr transformers.
- The control house will generate sound from two exterior condenser units that generate a sound level of approximately 50 dBA at 50 feet (15 m). This is based on typical climate control equipment used for such facilities (Bard, 2006).
- An 11.5-foot (3.5 m) perimeter wall made of a solid material (i.e. concrete and steel) will be installed around the SFEC-Interconnection Facility site.
- The frequency content of sound including octave band sound levels between 31.5 and 8000 Hz has been included in the modeling of transformers and reactors. The frequency content has been based on research that relates overall sound levels to octave band levels (Ver, et al., 1977)(Stevens and Hung, 2010).

SFEC-Interconnection Facility Operational Noise Assessment

Existing ambient night time sound levels range from 37.3 to 42.2 dBA (Leq) across all receptors in the study area. The existing ambient night time sound level at the closest receptor property line location (24 Horseshoe Drive) is 37.5 dBA (Leq). Based on the preliminary design of the SFEC-Interconnection Facility, sound from the facility is predicted to be 36.6 dBA (Leq) at the closest receptor property line location and 35.1 dBA (Leq) or less at all other receptor locations. Therefore, SFEC-Interconnection Facility sound is predicted to be below the absolute USEPA and Town of East Hampton noise criteria.

The future sound level, which includes sound from existing ambient sources and the SFEC-Interconnection Facility, at the closest receptor property line is predicted to be 40.1 dBA (Leq). Future sound levels would increase less than three dBA (37.5 dBA existing to 40.1 dBA future) at the closest receptor and all other receptor locations. Future increases in sound of less than three dBA is typically below the threshold of perception. Octave band sound levels from the SFEC-Interconnection Facility show that pure tone conditions are not anticipated. Sound levels in the 125 Hz octave band are up to three dB higher than adjacent bands. The criteria for determining the presence of pure tones are generally greater than three dB, particularly on an octave-band basis in the lower frequency range. Therefore, according to the NYSDEC noise policy there will be no effect in future noise conditions and there is no need for mitigation.

See the Sound Study Technical Report (Appendix E, Table 10) for further detail including the overall A-weighted and octave-band sound level predictions from the operation of the SFEC-Interconnection Facility at nearby receptor locations. Sound Study Technical Report (Appendix E, Table 11) presents further detail including the existing ambient nighttime sound levels at each receptor, the predicted sound from the SFEC-Interconnection Facility, the future nighttime sound level, and the increase in noise.

4.12.4 Mitigation and Best Management Practices

This section discusses the need for BMPs to minimize construction noise effects and mitigation to attenuate sound from the operation of the SFEC-Interconnection Facility.

4.12.4.1 Construction Noise Best Management Practices

The construction noise assessment shows that sound levels from HDD operations at the sea-to-shore transition and the construction of the SFEC-Interconnection Facility will be below applicable limits, and BMPs to reduce construction noise are not warranted. The sea-to-shore transition, as planned, already implements several sound attenuating features such as using a quieter model HDD and a 14 foot (4 m) perimeter sound wall to attenuate sound from propagating to nearby residences.

SFEC-Onshore cable installation will generally occur during daytime hours in accordance with the Town of East Hampton construction noise criteria. If necessary, BMPs to be used during SFEC-Onshore construction will be detailed within the Project EM&CP.

4.12.4.2 SFEC-Interconnection Facility Sound Attenuation

As presented in Section 4.12.3, *Noise Assessment*, the SFEC-Interconnection Facility, as designed, will generate sound below existing ambient sound levels. According to federal, state and local noise standards, there will be no impact and no need for mitigation due to the operation of the SFEC-Interconnection Facility. Further information on the specific design of the SFEC-Interconnection Facility will be detailed within the Project EM&CP.

4.13 Air Quality

This section includes an assessment of air quality associated with the construction, operation, and maintenance of the Project. The Clean Air Act (CAA) requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The NAAQS are based on total concentrations of pollutants in the ambient air (i.e. outdoor air that is accessible to the public (40 CFR 50.1(e)). The USEPA developed these ambient air quality standards for six common pollutants, known as criteria pollutants, for which ambient air quality standards exist: CO; lead; nitrogen dioxide (NO2); ozone (O3); particulate matter (PM); and sulfur dioxide (SO2). PM is a mixture of solid particles and liquid droplets found in the air and includes particles of varying sizes, and is categorized as PM10 and PM2.5 (USEPA, 2016). The NAAQS for each of the criteria pollutants are presented in Table 4.13-1 – Criteria Pollutants and National Ambient Air Quality Standards below.

Table 4.13-1 Criteria Pollutants and National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Time	Standard	
CO	Primary	Eight hours	9 ppm	Not to be exceeded more than once per year
		One hour	35 ppm	
Lead	Primary and Secondary	Rolling three month average	0.15 μg/m^3	Not to be exceeded
NO_2	Primary	One hour	100 ppb	98th percentile of one hour daily maximum concentrations, averaged over three years
	Primary and Secondary	One year	53 ppb	Annual mean
O_3	Primary and Secondary	Eight hours	0.070 ppm	Annual fourth-highest daily maximum eight hour concentration, averaged over three years
$PM_{2.5}$	Primary	One year	12.0 μg/m^3	Annual mean, averaged over three years
	Secondary	One year	15.0 μg/m^3	Annual mean, averaged over three years
PM_{10}	Primary and Secondary	24 hours	35 μg/m^3	98th percentile, averaged over three years
	Primary and Secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over three years
SO_2	Primary	One hour	75 ppb	99th percentile of one hour daily maximum concentrations, averaged over three years
	Secondary	Three hours	0.5 ppm	Not to be exceeded more than once per year

Source: 40 CFR 50

Note: Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic m of air (μg/m^3).

The CAA contains timeframes and milestones for states to meet and maintain NAAQS for criteria pollutants. Areas that do not meet the NAAQS based on an evaluation of available air quality data are designated as nonattainment areas. The USEPA reviews the NAAQS every five years, and may update the standards based on new scientific information and establish new monitoring requirements. Each state is required to monitor the ambient air to determine whether it meets each standard. If monitoring shows that the air quality does not meet a standard, the state must develop and implement pollution control strategies to attain that standard. Once air quality meets a standard, a state must develop a plan to maintain that standard while accounting for future economic and emissions growth.

In addition to the criteria pollutants discussed, air pollutants can be categorized as toxic or hazardous air pollutants (HAPs) or GHGs. There are no ambient air quality standards for HAPs or GHG; however, emissions are regulated through national manufacturing standards and permit requirements. HAPs are pollutants that are known or suspected to cause cancer or other serious health impacts, such as reproductive impacts or birth defects, or adverse environmental impacts (USEPA, 2017). Examples of HAPs include benzene (which is found in gasoline), dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

GHG are gases that trap heat in the atmosphere and include carbon dioxide, methane, nitrous oxide, and fluorinated gasses. The largest source of GHG emissions from human activities in the United States is from burning fossil fuels (mostly coal and natural gas) for electricity, heat, and transportation (USEPA, 2018a).

4.13.1 Existing Air Quality

Existing air quality data is not available specifically for New York State territorial waters; however, the NYSDEC Division of Air Resources is the responsible agency for monitoring air quality. NYSDEC operates a network of 50 air monitoring stations that measure ambient concentrations of pollutants, HAPs (at 12 monitoring stations), and meteorological data (NYSDEC, 2017). Long Island is considered Region 1, which has four monitoring stations. Two NYSDEC air quality monitoring stations are in the relative proximity to the Project in Holtsville and Riverhead, New York. According to the NYSDEC, New York State is in attainment with all the NAAQS, except for O3 (USEPA, 2018b), which is designated as moderate nonattainment (USEPA, 2017). Nonattainment is defined as the air quality is worse than the NAAQS. Trends for HAPs have generally been declining in New York State over the last ten years (NYSDEC, 2017d).

4.13.2 Potential Air Quality Impacts and Proposed Mitigation

During the construction phase of the Project, potential impacts to air quality are anticipated to be minor. Negligible to no impacts are anticipated during the operational phase, due to maintenance only being required when a fault or failure occurs. Cable failures are only anticipated to result because of damage from outside influences, such as boat anchors or unexpected digs from other parties, and will cause only a short-term, localized impact. The sections below describe the possible impacts and the mitigation techniques that will be utilized to diminish the construction and operational impacts of the Project.

4.13.2.1 Potential Construction Impacts and Mitigation

Construction of the Project will include an increase in construction equipment and vehicles, that are expected to emit (or have the potential to emit) air pollutants. Construction activities that will utilize primarily diesel-powered equipment include HDD operations, trenching/duct bank construction, and cable pulling and termination. In addition, a localized increase in fugitive dust may result during onshore construction activities. Air emissions during construction will be minimized by using low sulfur fuels where possible, limiting engine idling time, and using engines that comply with the applicable air quality regulations, such as the USEPA New Source Performance Standards or the engine National Emission Standards for HAPs, as appropriate. Additionally, vessels, vehicles, and equipment 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 BMPs, such as mulch, water sprinkling, and wind barriers. Further information on dust control measures will be detailed in the SWPPP within the Project EM&CP.

4.13.2.2 Potential Operational Impacts and Mitigation

Potential impacts from the O&M are expected to be smaller compared to the impacts anticipated during construction activities. During the O&M phase, the Project will generate few emissions from infrequent use of equipment engines, vessels, and vehicles, resulting in negligible impacts to regional air quality. In fact, the use of wind to generate electricity reduces the need for electricity generation from traditional fossil fuel powered plants, which produce GHGs. Mitigation techniques to minimize air emissions during Project O&M will be the same as discussed for the construction phase.

4.14 Electric and Magnetic Fields

This section includes an assessment of EMFs associated with the construction, operation, and maintenance of the Project. EMFs can be described as invisible lines of force that surround any electrical device (EMFRAPID, 2002).

Two assessments of EMF were conducted in support of the Project (see Appendix P for further details). The key findings from the EMF reports are provided below:

- Offshore, modeling results under winter normal conductor (WNC) conditions confirm that the maximum magnetic fields at 3.3 feet (one m) above the seabed are below 200 milligauss (mG) everywhere along the offshore portion of the Project.
- Calculated magnetic-field levels for offshore are further found to be below reported thresholds for effects on the behavior of magnetosensitive fish, and calculated induced

electric-field levels are found to be below reported detection thresholds of local electrosensitive fish.

- Onshore, the cables were modeled for line loadings equal to the WNC ratings as well as the maximum assumed output of the SFWF turbines. Modeling results under WNC conditions show that the maximum magnetic field ±50 feet (15 m) from the duct bank centerline in all portions of the route are below 200 mG for the configurations of the transmission lines.
- The electric field from the underground and submarine transmission cables is blocked by the cable protection as well as the earth and therefore will not be a direct source of any electric field outside the cables.

4.14.1 Existing EMF Conditions

Existing EMF conditions in the vicinity of the Project are the result of natural phenomena and/or existing operational electrical facilities constructed nearby.

4.14.1.1 EMF Standards and Guidelines

New transmission lines constructed in New York State operating at voltages above 100 kV must comply with the NYSPSC's Statement of Interim Policy (1990) EMF limits on emissions. Table 4.14-1 – New York State EMF Standards and Guidelines for Transmission Lines below presents the EMF Standards and Guidelines set forth for transmission line projects within New York State.

Table 4.14-1 New York State EMF Standards and Guidelines for Transmission Lines

Electric Field		Magnetic Field	
On ROW	**Edge of ROW**	**On ROW**	**Edge of ROW**
7.0 kV per meter (kV/m)[a] 11.0 kV/m[b] 11.8 kV/m[c]	1.6 kV/m	n/a	200 mG

Sources: NYSPSC, 1990 and NYSPSC, 1978

[a] Maximum for highway crossings

[b] Maximum for private road crossings

[c] For winter-normal, maximum line current capacity

In addition to New York State, 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 International Committee on Electromagnetic Safety (ICES, 2002), which operates "under the rules and oversight of the IEEE Standards Association Board," developed a maximum permissible exposure limit to magnetic fields of 9,040 mG for the general public. The International Commission on Non-Ionizing Radiation (ICNIRP, 2010), 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.

4.14.2 Potential EMF Impacts and Proposed Mitigation

This section details potential impacts from EMFs generated during the construction and operation phases of the Project.

4.14.2.1 Potential Construction Impacts and Mitigation

There are no anticipated EMF impacts during construction of the Project. No electrical equipment or transmission cables will be energized until the entire Project is operable.

4.14.2.2 Potential Operational Impacts and Mitigation

Electric fields from the voltage on conductors will be shielded by conductive sheaths and the ground itself. Therefore, conductors will not be a direct source of any electric field upon its operation and above ground electric-field levels were not calculated. Small electric fields will be induced by the oscillating magnetic fields, but electric fields will be several thousand times lower than the NYSPSC standards listed in Table 4.14-1. Therefore, no electric field mitigation is proposed.

Modeling of the magnetic field at WNC ratings showed that the magnetic field ±50 feet (15 m) from the duct bank/trench centerline along the SFEC-Onshore and SFEC-Interconnection Facility interconnection cable at one m above ground is a maximum 4.7 mG, far below the NYSPSC's 200 mG limit. Thus, calculations of the magnetic field are in accordance with the NYSPSC's standards. Additionally, the calculated magnetic field levels are well below the ICNIRP reference level of 2,000 mG and the ICES maximum permissible exposure limit of 9,040 mG for the general population. Therefore, no magnetic field mitigation is proposed for the SFEC-Onshore or SFEC-Interconnection Facility interconnection cable during operation.

Magnetic-field levels at the sea-to-shore transition corridor, where HDD will be utilized, are anticipated to be far lower than elsewhere along the SFEC-NYS due to the very deep burial depth of the cable. The maximum calculated magnetic-field level at WNC loading for the sea-to-shore transition corridor (directly above the HDD cable) is 0.3 mG at a burial depth of 62 feet (19 m), 1.8 mG at a burial depth of 22 feet (7 m), and 11 mG at a burial depth of seven feet (2 m). Thus, calculations of the magnetic field are in accordance with the NYSPSC's standards.

Details on potential EMF effects to marine organisms from the SFEC-NYS are discussed in Sections 4.9, *Finfish*, 4.10, *Benthic and Shellfish Resources,* and 4.11, *Important Habitats and Rare, Threatened, and Endangered Species*.

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