Clean Path New York LLC and the

New York Power Authority

Clean Path New York Project

Case 22-T-0558

Response to December 13, 2022 Deficiencies Letter

Attachment L

Revised Exhibit 4

Attachment L

Revised Exhibit 4 Redline

Attachment L

Revised Exhibit 4 Redline

Response to Deficiency #9

4.7 Wetlands and Water Resources

Pursuant to 16 NYCRR § 86.5, this section describes freshwater and tidal wetlands, freshwater streams and waterbodies, groundwater, and floodplains in and near the proposed transmission line corridor. Potential impacts to wetlands and freshwater resources associated with construction and operation of the Project are discussed. This section also includes the Project-specific measures that the Applicant will implement to avoid, minimize, and/or mitigate potential impacts to wetlands and freshwater resources.

Wetlands and waterbodies in New York may be protected under federal law, New York State law, or both. The Clean Water Act (CWA) regulates activities within jurisdictional waters of the United States, which include navigable waterways and their tributaries, bordering wetlands, and any other bordering or isolated waters, including tidal waters, with a significant nexus to other waterways, such that the use, degradation, or destruction of those waters could affect interstate or foreign commerce. USACE administers permitting and compliance under Section 404 of the CWA, which regulates discharge of dredged or fill material into waters of the United States. Construction of a transmission line within navigable waterways, such as the Hudson, Harlem, and East Rivers, additionally requires authorization from USACE under Section 10 of the Rivers and Harbors Act of 1899 (RHA).

Freshwater wetlands in New York State are regulated under the Freshwater Wetlands Act (FWA), Article 24 of the Environmental Conservation Law (ECL), and 6 NYCRR Part 663, which are administered by NYPSC for major transmission facilities such as the Project. Mapped wetlands that are at least 12.4 acres in size and found in the NYSDEC Environmental Resource Mapper (ERM) freshwater wetland database, or that are of unusual local importance pursuant to FWA, Article 24 of the ECL, are subject to regulation under the FWA. The FWA also applies to 100-ft (30-m) wetland "adjacent areas" or buffer areas, which are generally defined as those areas of land or water that are outside of the wetland and within 100 ft (30 m) of the surveyed wetland boundary. The FWA also applies activities within the 100-ft adjacent area outside of the wetland boundary.

Tidal wetlands in New York are protected under Article 25 of the ECL and are considered "those areas which border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters." In addition, per 6 NYCRR § 661.4, adjacent areas up to 300 ft (91.4 m) (150 ft [45.7 m] within New York City) inland from the tidal wetland boundary are regulated to provide further protection to tidal wetland resources. NYSDEC also regulates activities in tidal wetlands and adjacent areas.

Under Article 15 of the ECL, New York classifies surface water resources by their best uses (fishing, source of drinking water, etc.; 6 NYCRR Part 701) or as Wild, Scenic and Recreation Rivers (6 NYCRR Part 666). State water quality classifications of freshwater watercourses fall into four categories, based on the assigned best uses by NYSDEC:

- Classification AA or A: source of drinking water;
- Classification B: swimming and other contact recreation but not for drinking water;
- Classification C: waters supporting fisheries and suitable for non-contact activities; and
- Classification D: lowest classification/standard.

Freshwater water resources with classifications AA, A, B, and C may also have a standard of (T), indicating that the resource may support a trout population, or (TS), indicating that it may support trout spawning. Special requirements apply to sustain these waters that support these valuable and sensitive fisheries resources (Section 4.9.2 contains a discussion of trout resources). Water quality classifications for tidal waterbodies are discussed in Section 4.8.

Flood Hazard Areas are those areas of land that would be covered by the floodwaters of the base flood, also known as the 100-year flood, which is defined as a flood that statistically has a 1% probability of being equaled or exceeded any given year. Development within floodplains in New York State is subject to local law requirements imposed by municipalities (e.g., town, city, or village) that participate in the National Flood Insurance Program. Procedural requirements to obtain any local approval, consent, permit, or certificate are pre-empted under PSL § 130. Additional information on local ordinances, including those associated with floodplain development, and their applicability to the Project is provided in **Exhibit 7: Local Ordinances**.

4.7.1 Wetlands and Freshwater Resources Studies and Analyses

Available environmental data sources were used for the evaluation of wetlands and freshwater resources. These include: the USFWS NWI database, NYSDEC ERM Wetlands Databases (freshwater and tidal), NYSDEC Water Quality Classification Database, USGS SGS National Hydrographic Dataset, USGS water resources investigations reports, NYSDEC mapped wells, SSURGO Soils, National Flood Hazard Layer geospatial database, FIRM floodplain mapping, and recent and historic satellite imagery.

Field delineations were also performed along the terrestrial transmission line corridor and at the converter station and landfall sites. The field delineations were conducted at varying times from October 18, 2021, through June 14, 2022, during appropriate survey conditions. The wetland delineation methodologies outlined in the *1987 Corps of Engineers Wetlands Delineation Manual* (1987 Corps Manual) (USACE 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual Northcentral and Northeast Region* (NC&NE Regional Supplement) (USACE 2011), and the *New York State Freshwater Wetlands Delineation Manual* (NYSDEC 1995) were used to identify and delineate wetlands. Wetlands identified were classified consistent with the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). The methods used to delineate wetlands, streams/rivers, and other waterbody features are further described in the Project's WDR (Appendix H to this Exhibit).

4.7.2 Existing Freshwater Wetlands

A total of 16 NYSDEC-mapped freshwater wetlands are present within the terrestrial transmission line corridor. The 500-ft (152-m) check zones of an additional 24 freshwater wetlands are mapped within the terrestrial corridor. A summary of the NYSDEC-mapped freshwater wetlands and 500-ft (152-m) check zones mapped within the terrestrial transmission line corridor is provided in Table 4-7. These features are also shown on Figure 3 of the WDR in Appendix H to this Exhibit.

Table 4-7. NYSDEC-Mapped Freshwater and Freshwater Tidal Wetlands and Check Zones within the Terrestrial Transmission Line Corridor

NYSDEC Wetland ID	NYSDEC Class[1]	Feature Type (Wetland or Check zone)	Area (Acres)
DL-15	1	500-ft check zone	4.0
GO-40	2	500-ft check zone	8.5
GO-6	2	500-ft check zone	2.9
GO-8	2	wetland and check zone	19.3
H-6 (tidal)	1	500-ft check zone	0.9
HA-22	3	500-ft check zone	4.5
HA-3	2	500-ft check zone	5.2
HA-5	3	wetland and check zone	7.0
LM-18	2	wetland and check zone	7.3
LW-28	2	wetland and check zone	5.7
LW-30	2	500-ft check zone	5.4
LW-4	2	500-ft check zone	4.0
MD-17	4	wetland and check zone	4.9
MD-18	2	wetland and check zone	6.4
MO-62	2	wetland and check zone	35.5
NB-21	1	500-ft check zone	4.2
NB-25	2	wetland	0.1
NB-26	2	500-ft check zone	5.9
NB-29	2	500-ft check zone	0.0
OT-1	2	500-ft check zone	4.0
OT-18	2 and 3	wetland and check zone	4.5
OT-19	2	wetland and check zone	13.6
OT-5	2	wetland and check zone	10.8
PE-4	2	500-ft check zone	0.8
PK-2	2	500-ft check zone	23.9
RO-3	2	500-ft check zone	0.7
RO-7	3	wetland and check zone	5.3
RO-9	2	500-ft check zone	8.4
WD-36	2	500-ft check zone	0.7
WD-37	2	500-ft check zone	7.9
WD-38	2	500-ft check zone	8.7
WD-46	2	500-ft check zone	16.6
WD-47	2	wetland	0.3
WL-19	2	wetland and check zone	10.5

NYSDEC Wetland ID	NYSDEC Class[1]	Feature Type (Wetland or Check zone)	Area (Acres)
WL-31	3	wetland and check zone	11.1
WL-56	2	500-ft check zone	3.2
WL-7	2	wetland and check zone	10.1
YL-20	2	500-ft check zone	4.9
YL-27	2	500-ft check zone	8.3
YL-28	2	500-ft check zone	3.3
		Total	289.5

[1] Per 6 NYCRR § 664.5, not all wetlands supply equal benefits and depend upon several parameters like ecological associations (wetland and waters connectivity), special features (T&E species presence, migratory species, etc.), hydrological and pollution control features, distribution and location (i.e., proximity to an urban area or within state lands), and cover type (i.e., vegetative cover). Class I wetlands are afforded the highest level of protection while Class IV wetlands are afforded the lowest level of protection.

The NYSDEC ERM Wetlands Database did not show any NYSDEC-mapped freshwater wetlands within the northern or southern converter station locations or landfall sites.

A total of 334 uniquely named wetlands (480 occurrences) were delineated within the terrestrial transmission line corridor; one unique name was assigned to each wetland, even if the wetland was classified as multiple Cowardin classification types (occurrences). No wetlands were delineated within the northern or southern converter stations or landfall sites. The boundaries of delineated wetlands are shown in Figure 5 of the WDR (see Appendix H to this Exhibit). Table 4-8 summarizes the wetlands identified during the field delineation. Information for each wetland delineated within the terrestrial corridor is provided in Attachment 4 to this Exhibit.

Table 4-8. Summary of Delineated Freshwater Wetlands within the Terrestrial Transmission Line Corridor

Cowardin Classification Type	Number of Wetlands	Length Crossed (miles) in Terrestrial Corridor	NYSDEC Wetland Crossed in Corridor (miles)
Palustrine Emergent	305	9.2	0.4
Palustrine Scrub-Shrub	152	5.2	1.0
Palustrine Forested	11	1.0	0
Palustrine Unconsolidated Bottom	12	0.2	0
Total	480[1]	15.6	1.4

[1] This total exceeds the 334 uniquely named wetlands due to some wetlands containing more than one wetland community classification.

Of the 334 wetlands identified during survey efforts, 21 occur in, or in proximity to, areas mapped by NYSDEC as State-regulated resources, and therefore are potentially afforded protection under Article 24 of the ECL (hereafter referred to as State-regulated wetlands). Detailed descriptions of the freshwater wetland community types present in the terrestrial transmission line corridor are included in the WDR (see Appendix H to this Exhibit).

4.7.3 Existing Tidal Wetlands

Tidal wetlands are defined under New York ECL Article 25-0103 as:

> *(a) those areas which border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters; and*
>
> *(b) (b) all banks, bogs, meadows, flats and tidal marsh subject to such tides, and upon which grow or may grow some or any of the following: salt hay (Spartina patens and Distichlis spicata), black grass (Juncus Gerardi), saltworts (Salicornia ssp.), sea lavender (Limonium carolinianum, tall cordgrass (Spartina pectinata and Spartina cynosuroides), hightide bush (Iva frutescens), cattails (Typha angustifolia and Typha latifolia), groundsel (Baccharis halmilifolia), marsh mallow (Hybiscus palustris) and the intertidal zone including low marsh cordgrass (Spartina alterniflora).*

NYSDEC's regulations implementing ECL Article 25 are codified at 6 NYCRR § 661, which sets out the Tidal Wetlands Land Use Regulations for the State. Under these implementing regulations, tidal wetlands are further defined at 6 NYCRR § 661.4 as:

> *Tidal wetlands or wetland shall mean any lands delineated as tidal wetlands on an inventory map and shall comprise the following classifications as delineated on such map:*
>
> *(1) Coastal fresh marsh.*
>
> *The tidal wetland zone, designated FM on an inventory map, found primarily in the upper tidal limits of riverine systems where significant fresh water inflow dominates the tidal zone. Species normally associated with this zone include narrow leaved cattail, Typha angustifolia the tall bracklish water cordgrasses, Spartina pectinata and/or S. cynosuroides; and the more typically emergent fresh water species such as arrow arum, Peltandra; pickerel weed, Pondederia; and cutgrass, Leersia.*
>
> *(2) Intertidal marsh.*
>
> *The vegetated tidal wetland zone, designated IM on an inventory map, lying generally between average high and low tidal elevation. The predominant vegetation in this zone is low marsh cordgrass, Spartina alterniflora.*
>
> *(3) Coastal shoals, bars and flats.*
>
> *The tidal wetland zone, designated SM on an inventory map, that (i) at high tide is covered by water, (ii) at low tide is exposed or is covered by water to a maximum depth of approximately one foot, and (iii) is not vegetated by low marsh cordgrass, Spartina alterniflora, except as otherwise determined in a specific case as provided in § 661.16 of this Part.*
>
> *(4) Littoral zone.*
>
> *The tidal wetlands zone, designated LZ on an inventory map, that includes all lands under tidal waters which are not included in any other category, except as otherwise determined in a specific case as provided in § 661.16 of this Part. Provided, there shall be no littoral zone under waters deeper than six feet at mean low water. Pending determination by the commissioner in a particular case, the most recent, as of the effective date of this Part, national ocean survey maps published by the national ocean survey, national oceanic and atmospheric administration shall be rebuttable presumptive evidence of such six foot depth.*

(5) High marsh or salt meadow.

The normal uppermost tidal wetland zone, designated HM on an inventory map, usually dominated by salt meadow grass (Spartina patens) and spike grass (Distichlis spicata). This zone is periodically flooded by spring and storm tides and is often vegetated by low vigor, Spartina alterniflora and Seaside lavender, Limonium carolinianum. Upper limits of this zone often include black grass, Juncus Gerardi; chairmaker's rush, Scirpus sp;marsh elder, Iva frutescens; and groundsel bush, Baccharis halimifolia.

(6) Formerly connected tidal wetlands.

The tidal wetlands zone, designated FC on an inventory map, in which normal tidal flow is restricted by man-made causes. Typical tidal wetland plant species may exist in such areas although they may be infiltrated with common reed, Phragmites sp.

One tidal wetland (W-T28-029; listed as NYSDEC Wetland ID H-6 in Table 4-7) was delineated and mapped during field surveys in proximity to the proposed terrestrial transmission line corridor at the southeastern end of Croton Point. Per the NYS tidal wetland regulations and based on the non-engineered condition of the adjacent coastal bank in this location, the State-regulated adjacent area for this tidal wetland is a 300 ft (91 m) buffer. No portion of the regulated adjacent area of this tidal wetland is within the terrestrial corridor.

No tidal wetlands mapped by NYSDEC as coastal fresh marsh; intertidal marsh; coastal shoals, bars and flats; high marsh or salt meadow, or formerly connected tidal wetlands are crossed by the transmission line corridor. Per the littoral zone definition provided above, tidal wetlands include all areas mapped shallower than 6 ft (1.8 m) at MLW and that are affected by either marine, estuarine, or freshwater tidal hydrologic influences. With respect to the proposed Project corridor, tidal wetlands in the Hudson River and its tributaries are marine and/or estuarine influenced up the river to the first dam located in Troy, New York, where they are considered freshwater tidal wetlands at that location (see Section 4.7.1). Based on analysis of Project-specific bathymetric survey data, the submarine corridor crosses approximately 5.2 miles of littoral zone tidal wetlands as defined above. Due to the very narrow strips of littoral zone tidal wetlands crossed, they only cover approximately 7.3 acres of the proposed submarine corridor

4.7.4 Existing Freshwater Resources

4.7.4.1 Watersheds

The terrestrial transmission line corridor is located within the Mid-Atlantic region (Hydrologic Unit Code [HUC] 2); the Lower Hudson, Upper Hudson, and Upper Delaware basins (HUC 6); and the Basher Kill, Beaver Kill, Bronx River-East River, Callicoon Creek-Delaware River, Lower East Branch Delaware River, Lower Wallkill River, Middle East Branch Delaware River, Middle Wallkill River, Middle West Branch Delaware River, Mongaup River, Moodna Creek, Neversink River, Peekskill Hollow Creek-Hudson River, Quassaic Creek-Hudson River, Saw Mill River-Hudson River, Shawangunk Kill, and Willowemoc Creek (HUC 10) watersheds.

New York State has eight use classifications for fresh surface waters and watersheds according to “best use” classification. They are listed in order of protection (N affords the most and D the least): N, AA-special (AA-S), A-special (A-S), AA, A, B, C, and D. Classes AA-S, A-S, AA (collectively Class AAs) and A all support use as a drinking water source, culinary or other food processing source, recreation, fishing, and for fish propagation; Classes B, C, and D are not a source for drinking water and are used for recreation and fishing.

The terrestrial transmission line corridor crosses 15.8 miles of five separate Class AAs watersheds (HUC level 12) in Delaware County along the NYPA Marcy South ROW (see Table 4-9). Three of the five Class AAs watersheds are part of the New York City Watershed: Platner Brook-West Branch Delaware River; Bagley Brook-West Branch Delaware River; and Murphy Hill Brook-Pepacton Reservoir. The combined crossing distance of these watersheds is 13 miles. The Class AAs and New York City Watershed boundaries in relation to the terrestrial transmission line corridor are shown on Figure 4-4 (see Attachment 1 to this Exhibit).

Table 4-9. Class AAs Watersheds Crossed by the Terrestrial Transmission Line Corridor

NY Watershed Basin ID	HUC 12 Watershed Name	Watershed Length in Corridor (Miles)	Watershed Area in Corridor (Acres)	Length of Delineated Streams in Corridor (Feet)	Within NYC Water Supply Watershed
7126	Platner Brook-West Branch Delaware River	2.74	100.7	505	Yes
6967		0.73	74.8	925	
6907		0.57	36.2	292	
7164		0.29	83.0	514	
7201	Bagley Brook-West Branch Delaware River	2.76	68.5	704	
8338	Lower Willowemoc Creek	1.39	26.6	833	No
8406	Little Beaver Kill	1.37	25.6	342	No
7385	Murphy Hill Brook-Pepacton Reservoir	2.30	44.5	981	Yes
7490		2.25	43.6	971	
7474		1.40	29.2	315	
Total		**15.78**	**532.7**	**7,424**	

The New York City Watershed covers about 2,000 square miles of southeastern New York and encompasses three main watersheds: the Catskill and Delaware Watersheds to the west of the Hudson River and the Croton Watershed to the east. The terrestrial transmission line corridor is within the Delaware Watershed. This system provides high quality drinking water to more than nine million people in New York City and its suburbs. More than one billion gallons of unfiltered drinking water is delivered by gravity each day from 19 reservoirs and transported via three massive aqueducts (NYSDEC 2022e).

Most of the water contained in the New York City Watershed system is provided by precipitation (rain and snow) that falls within the watershed and is conveyed to the reservoirs by numerous streams. Each of the 19 reservoirs and their major tributaries are monitored continuously (NYSDEC 2022e).

The New York City Watershed Agreement was signed in January 1997 to protect the quality of the New York City Watershed. NYCDEP in partnership with NYSDEC is responsible for the management and protection of the New York City Watershed Program (NYCWP). Under authority granted by New York State's Public Health Law, NYCDEP has enacted regulations to protect the existing high quality of the New York City water supply and preserve it from future degradation (NYCDEP 2019a); such regulations apply to NYPSC in its supervision of the Project under PSL Article VII. Activities associated with the proposed Project, specifically land clearing and land grading within 100 ft (30 m) of a watercourse or wetland within the New York City Watershed, are subject to the NYCDEP Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and its Sources (NYCDEP 2019a).

Within the portion of the terrestrial transmission line corridor that crosses the New York City Watershed, 34 delineated streams are present for a total of 9,081 ft (2,768 m). At its closest, the terrestrial transmission line corridor is within 2.5 river miles upstream of the Pepacton Reservoir where the corridor crosses an unnamed tributary to Bryden Hill Brook and approximately 23 miles upstream of the Cannonsville Reservoir.

The terrestrial transmission line corridor also crosses the following aqueducts that provide water to New York City, as shown on Figure 4-4 (see Attachment 1 to this Exhibit):

- West Delaware Aqueduct – conveys water from Cannonsville Reservoir to Rondout Reservoir; corridor crossing is in the vicinity of the East Branch Delaware River (Hancock, Delaware County, New York); and
- Catskill Aqueduct – conveys water from Ashokan Reservoir to Kensico Reservoir; two corridor crossings: one is in the vicinity of I-84 and South Plank Road (Newburgh, Orange County, New York), the other is in the vicinity of the Hudson River (Cornwall, Orange County, New York).

The other two AAs watersheds crossed by the transmission line corridor, Lower Willowemoc Creek and Little Beaver Kill, are crossed for a combined 2.8 miles. The corridor crosses one Class AA stream in these watersheds, Abe Wood Brook.

4.7.4.2 Stream and Riverine Resources

Stream and riverine resources are defined herein as lotic, or flowing water, systems. NYSDEC ERM mapping identifies 79 unique streams, with 185 occurrences, within the terrestrial transmission line corridor. An occurrence is determined as an individual stream segment within the ROW that could be a part of a larger system (i.e., Stream "A" meanders in and out of the ROW, where each segment, or reach, may have a different calculated length and area). There are no NYSDEC Wild, Scenic, and Recreational Rivers and no national Wild and Scenic Rivers within the corridor. No NYSDEC-mapped streams are located within the converter station and landfall sites.

New York State classifies streams according to freshwater use classification. These stream classifications could be followed by a standard of either "T" or "TS" that is described in more detail in Section 4.7.4.2. The classification rankings are as follows:

- Class AA and A are designated for drinking water;
- Class B is designated public for swimming and contact recreation activities;
- Class C is designated for fishing and non-contact activities; and
- Class D is designated as not supportive of any of the aforementioned uses.

Field delineations identified 221 freshwater streams, which account for 231 occurrences (e.g., crossings) within the terrestrial transmission line corridor, including 94 streams that are classification C(T) or higher. A total of 132 streams were classified as perennial, 78 streams were classified as intermittent, and 19 streams were classified as ephemeral. A summary of field-delineated streams within the terrestrial transmission line corridor, by flow regime, is provided in Table 4-10 and illustrated on Figure 5 of the WDR (see Appendix H to this Exhibit). Stream data forms (including information regarding flow regime, ordinary high-water mark width, depth, substrate, observed water quality, bank slope, bank substrate, gradient, and adjacent vegetation) are provided in Appendix A-4 of the WDR (Appendix H). Appendix A-2 of the WDR (Appendix H to this Exhibit) provides tables with stream name, flow regime, NYSDEC stream

classification, and linear feet within the terrestrial transmission line corridor. Information for each stream delineated within the terrestrial corridor is also provided in Attachment 5.

No streams were delineated within the converter station or landfall sites. One stream, East Platner Brook (Class C(TS)), was delineated approximately 100 ft (30 m) to the east of the northern converter station site.

Table 4-10. Summary of Delineated Freshwater Streams within the Terrestrial Transmission Line Corridor

Flow Regime	Number of Freshwater Streams	Length within the Corridor (ft)	Number of Class C(T) or Higher Streams
Ephemeral	19	2,808	0
Intermittent	78	15,941	1
Perennial	134	32,176	93
Total	231	50,926	94

Lotic systems (i.e., streams, rivers, and other drainages) are sorted into three classes to support the discussion of Project stream crossings by the Project as follows:

- Minor Stream Resources – defined as less than 10 ft (3 m) in width;
- Intermediate Stream Resources – that are defined as 10 ft to 100 ft (3 m to 30 m) in width; and
- Major Stream Resources – defined as greater than 100 ft (30 m) in width.

Minor Stream Resources

Minor crossings account for the majority of the stream crossings, with 199 minor crossings out of the total 231 delineated streams, or approximately 86% of the crossings. These total 40,206 ft (7.6 miles [12 kilometers]) within the terrestrial transmission line corridor. Two of these minor streams (Abe Wood Brook and an unnamed tributary to Matawa Lake) are classified by NYSDEC as AA streams. The flow regimes of the minor streams include 19 ephemeral, 77 intermittent, and 103 perennial streams. The widths of the stream crossings range from 1 ft (0.3 m) to a maximum of 10 ft (3 m); the average width is estimated to be 3 ft (1 m). These streams were typically high order streams found where topographic relief is greater (i.e., mountainous terrain). The stream gradients ranged from flat-moderate (0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]) to severe (>10-ft per 100-ft [3-m per 30-m]). Stream bottom substrates primarily comprised exposed bedrock, boulder, and cobble with other inclusions of sand, silt, and gravel. All of the streams were observed to have shallow water depths, ranging from approximately 0-ft (0 m) (dry) to 1 ft (0.3 m) during the course of the stream delineations. Bank heights for these systems ranged from 0.5-ft to 12-ft (0.2-m to 4-m) with the majority less than 3-ft (1-m) in height.

Intermediate Stream Resources

Intermediate crossings within the terrestrial transmission line corridor account for 10,026 ft (3,056 m) across the Project, with 29 total crossings or approximately 12.5% of all crossings. These include 15 named streams: Bagley Brook, Basher Kill, Cattail Brook, East Platner Brook, Kine Brook, Mannayunk Kill, Mercer Brook, Monhagen Brook, Mongaup River, Peaks Brook, Shawangunk Kill, Trout Brook, West Branch Delaware River (a USACE traditionally navigable waterway), West Platner Brook, and Wilson Hollow Brook. Two of these streams (Shawangunk Kill and an unnamed tributary to Indigot Creek) are listed as "A" streams by NYSDEC. The flow regimes were observed to include 28 perennial streams and 1 intermittent stream. The crossing widths of the streams range from 13 ft (4 m) to a maximum of 80 ft (24 m), with an average width of 29 ft (9 m) across all the intermediate crossings. Stream gradients ranged from

flat-moderate (0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]) to moderate (2-ft to 5-ft per 100-ft [0.6-m to 1.5 m per 30 m]). Water depths ranged from approximately 2 in (0.1 m) to 2 ft (0.6 m) over the course of the field delineations. Substrate composition included bedrock, boulder, and cobble to sand, silt and gravel. Bank heights for these systems ranged from 1 ft to 4 ft (0.3 m to 1.2 m).

Major Stream Resources

Major crossings within the terrestrial transmission line corridor account for 693 ft (211 m) across the extent of the Project and are represented by three perennially flowing river crossings, or approximately 1.2% of the total Project stream crossings. These three rivers are the Neversink River, the East Branch of the Delaware River, and the Wallkill River. Note that the width of the Beaver Kill is greater than 100 ft within the NYPA ROW, but is slightly less than 100 ft (30.5 m) at the location of the proposed crossing. The Neversink River was given a NYSDEC class and standard of B(T), and the East Branch Delaware River was given a NYSDEC class and standard of C(T). Each major stream is listed as a USACE traditional navigable waterway. The minimum crossing width is 105 ft (32 m); the maximum is 250 ft (76 m), and the average is 177 ft (54 m). The stream gradients are characterized as flat (0.0-ft to 0.5-ft per 100-ft [0.0-m to 0.2-m per 30 m]) to flat-moderate 0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]). Bank heights range from 3 ft to 8 ft (1 to 2 m). Observed substrate composition ranged from bedrock, boulder, and cobble to sand, silt and gravel.

4.7.4.3 Trout and Trout Spawning Stream Classifications

In addition to designating stream classifications, NYSDEC also designates a standard of either “T” or “TS” to these classifications. This offers another level of protection to the stream. The designation of “T” indicates that the waterbody could support a trout population, and “TS” indicates that the waterbody could support trout spawning. Special requirements are provided to these as valued resources. If streams have a class of AA, A, B, or C (with the “T” or “TS” standard), they are considered “protected streams.” Of the 221 delineated streams, 94 streams are potentially considered protected with the aforementioned designations. More information relating to trout streams is discussed in Section 4.9.2.4.

4.7.4.4 Other Freshwater Resources

A total of 11 other waterbodies (e.g., lentic, non-flowing systems) were mapped during field delineations within the terrestrial transmission line corridor. Combined, they occupy approximately 4.1 acres within the terrestrial corridor. The waterbodies observed are relatively small and include a mix of artificial impoundments (i.e., storm water basins, residential ponds, farm ponds) and natural ponded areas within wetland complexes. The five artificial impoundment waterbodies total approximately 2.0 acres and the six natural ponded waterbodies total approximately 2.1 acres. Two of the natural ponded areas occur within mapped NYSDEC freshwater wetlands LW-4 and WL-7.

4.7.5 Existing Groundwater

Groundwater occurs in saturated zones under the land surface; this is where the water table occurs. Groundwater fills pores and fractures in subsurface materials such as soils, gravel, sand, and bedrock. Along the terrestrial transmission line corridor, groundwater is found in glacial deposits, fluvial deposits of sand and gravel as well as floodplain deposits of silt, sand, and gravel, and bedrock formations. Aquifer recharge occurs from precipitation directly on the land by seepage from tributary streams, rivers, and lakes flowing across the aquifer by subsurface flow from till on sides of the valleys, and by seepage from bedrock and deposits of low permeability adjacent to aquifers (USGS 2019).

In New York State, to enhance regulatory protection in areas where groundwater resources are most productive and most vulnerable, the New York State Department of Health (NYSDOH) identifies Primary Water Supply Aquifers, also referred to as Primary Aquifers. The terrestrial transmission line corridor crosses one unnamed Primary Aquifer along the Route 9/9A corridor in Westchester County. The crossing distance is about 3.5 miles, ending at Croton Point.

As defined by EPA, a sole source aquifer is one which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. Such areas have no alternative drinking water source that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water (EPA n.d.). No portion of the Project crosses or overlies a sole source aquifer.

Seeps and springs are areas where groundwater emerges to the surface and often forms and/or feeds into a waterbody or wetland. In general, waters from seeps and springs eventually find their way to surface waters through overland flow or ground percolation. Seeps and springs were identified within the terrestrial transmission line corridor during wetland field investigations. In total, 21 seeps and/or springs were identified, all of which are in Sullivan and Delaware Counties (18 in Sullivan County and 3 in Delaware County), where water was observed discharging from below ground to the surface. Seep and spring locations are shown on Figure 6 of the WDR in Appendix H to this Exhibit.

No private or municipal wells were identified incidentally during wetland and other field surveys within the terrestrial transmission line corridor. The Applicant will correspond with abutting landowners to identify wells prior to construction; any wells identified within 50 ft (15 m) of the construction workspace will be identified in the EM&CP.

4.7.6 Existing Floodplains

FEMA is responsible for mapping and delineating floodplains and determining the flood risk for susceptible areas. The National Flood Hazard Layer is a geospatial database that contains current flood hazard data, provided by FEMA within the United States. FIRM mapping issued by FEMA includes Special Flood Hazard Areas (SFHAs), Base Flood Elevation, and risk zones applicable to an area. Special Flood Hazard Areas are areas that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. This 1% annual chance flood is also referred to as the base flood or 100-year flood.

As summarized in Table 4-11, the proposed transmission line corridor crosses 4.4 miles of SFHAs (i.e., 100-year floodplains). FEMA-mapped 100-year floodplain crossings are shown on Figure 3 in the WDR (Appendix H to this Exhibit). As shown, floodplain crossings occur predominantly as relatively narrow crossings along stream systems.

Table 4-11. FEMA-Mapped Special Flood Hazard Areas Crossed by the Terrestrial Transmission Line Corridor

FEMA Flood Zone	Flood Zone Name	Flood Zone Description	Distance
A	100-yr Flood Zone (w/out Base Elevations	Areas with 1% annual chance of flooding	0.7
AE	100-yr Flood Zone (w/ Base Elevations)	Areas with 1% annual chance of flooding (base flood elevation)	X3.7
VE	100-yr Flood Zone (Coastal)	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves.	<0.1
Total			**4.4**

The southern converter station site includes 0.4 acres of SFHEs (Zone AE). No SFHAs are present within the northern converter station site.

4.7.7 Wetlands and Water Resources Impacts and Mitigation Measures

Locations currently identified by the Applicant for trenchless crossings of wetlands and streams are listed in Table 4-12, subject to confirmation from ongoing geotechnical investigation and detailed design. The Applicant is in the process of consulting with NYSDPS and NYSDEC regarding crossing methods for all State-regulated streams and wetlands within the Project area, so this table is not a final list of trenchless crossing locations. The Applicant is also in the process of conducting and reviewing results of geotechnical investigations to assess the feasibility of trenchless crossings at numerous locations. An updated list of trenchless crossing locations will be provided in the Project's EM&CP.

Table 4-12. Working List of Trenchless Crossing Locations for Wetlands and Streams

Feature	Location			Approximate Crossing Distance (feet)	Trenchless Crossing Method
	Mile-post	Town	County		
West Branch Delaware River	2.3	Delhi	Delaware	1,660	HDD
East Branch Delaware River	26.7	Hancock	Delaware	TBD	Crossing method to be determined based on geotechnical investigation results
Beaver Kill	30.7	Colchester	Delaware	1,980	HDD
NYSDEC Wetland LM-18	42.0	Liberty	Sullivan	990	HDD
Beaver dam/pond (NYSDEC Wetland LW-4)	45.6	Liberty	Sullivan	1,050	HAB
Mongaup River	59.4	Bethel/Thompson	Sullivan	1,170	HDD
NYSDEC Wetland MO-62	64.8	Monticello	Sullivan	11,000	Series of HDDs
Neversink River	70.3	Thompson	Sullivan	1,200	HDD
Basher Kill	80.6	Cuddebackville	Orange	1,550	HDD
Monhagen Brook	92.6, 93.4, 94.0	Wawayanda	Orange	1,140	HDD
Wallkill River	103.5	Montgomery	Orange	1,230	HDD
Landfall 1 – Newburgh-Beacon Bridge	117.2	Newburgh	Orange	2,080	HDD
Landfall 2 – Charles Point	136.7	Peekskill	Westchester	2,960	HDD
Landfall 3 – Croton Point	146.6	Croton-on-Hudson	Westchester	2,600	HDD
Landfall 4 – Randall's Island West	173.9	New York	New York	1,800	HDD
Landfall 5/6 – East River	174.8	New York	New York / Queens	2,220	HDD

4.7.7.1 Freshwater Wetlands Potential Impacts and Proposed Mitigation

The terrestrial transmission line corridor crosses approximately 15.6 miles of delineated freshwater wetlands. Based on a typical and anticipated 50-ft-wide (15-m-wide) construction corridor through wetlands, up to approximately 86.0 acres of wetlands could be temporarily disturbed during construction of the transmission line (the Applicant will refine the width of the construction corridor through wetlands during final design and include updated impact calculations, as necessary, in the EM&CP). Wetland community type impacts include the following: palustrine emergent: 49.0 acres; palustrine scrub/shrub: 30.1 acres; palustrine forested: 5.0 acres; and palustrine unconsolidated bottom: 1.2 acre. The Applicant anticipates that the total temporary wetland disturbance area will ultimately be less than 86.0 acres through a combination of trenchless crossings of some wetlands and micro-siting of the transmission line centerline within the certificated corridor. Revised wetland impact calculations will be provided in the EM&CP.

At this time, Project design includes the preliminary locations of construction access roads; however, final access road design is not complete. The Applicant plans to use existing access roads to the maximum extent possible which will limit any impacts to wetlands. Additional details will be provided in the EM&CP.

The terrestrial transmission corridor crosses approximately 1.4 miles of 21 wetlands which are potentially State-regulated wetlands. Based on a typical and anticipated 50-ft-wide (15-m-wide) construction corridor, up to approximately 8.6 acres of State-regulated wetlands could be temporarily disturbed during construction of the transmission line. State-regulated wetland community type impacts include the following: palustrine emergent: 2.4 acres; and palustrine scrub/shrub: 6.2 acres. No State-regulated forested wetlands are crossed within the terrestrial transmission line corridor, nor are any Class 1 wetlands. There are 15 crossings of Class 2 wetlands for 0.9 miles with a potential disturbance area of 5.5 acres. The Applicant anticipates that the total temporary wetland disturbance area within state-regulated wetlands will ultimately be less than 8.5 acres through a combination of trenchless crossings of some state-regulated wetlands and micro-siting of the transmission line centerline within the certificated corridor. Revised wetland impact calculations will be provided in the EM&CP.

Emergent wetland vegetation is expected to return quickly following construction, and woody species will return more slowly. Forested and scrub/shrub wetlands, where not maintained, are expected to go through several stages of successional vegetation before returning to the pre-construction vegetation cover type.

Surface and subsurface soil disturbance associated with installation of the transmission line in wetlands will temporarily alter soil profiles. The degree to which wetland soils would be impacted is variable depending on site-specific conditions present at the time of construction, including water levels/depths, the degree of soil saturation, and/or the bearing capacity of the soils. Other construction activities causing ground disturbance within, and adjacent to, wetlands may also result in temporary, localized changes to surface runoff and stormwater sheet flow patterns that may temporarily modify wetland hydrology. These changes will modify localized infiltration and percolation patterns and surface water contributions to, or discharges from, wetlands but such changes will be temporary with implementation of the BMPs summarized below.

Protective measures will be implemented during construction to avoid and minimize impacts to wetlands, as briefly summarized below. All wetland protective measures will be documented in the Applicant's SWPPP and EM&CP.

In locations where open trenching in wetlands occurs, the top 1 ft of topsoil will be segregated to the extent possible. Immediately after backfilling open trenches, segregated topsoil will be returned to its original location. Doing so will facilitate wetland revegetation by maintaining local surface soil physical and chemical characteristics and replacing the local native seed bank. In addition, backfilling trenches followed

by grading to pre-construction contours will occur according to BMPs. This will be accomplished to maintain the overall extent of affected wetlands as well as their original site hydrology and flow circulation.

The Applicant will avoid storing spoil within wetlands to the extent possible. Limited spoil storage may occur in wetlands where there are spatial constraints along the construction corridor such as in the vicinities of railroad and NYSDOT ROWs. In these areas, soil will be temporarily stockpiled on construction matting or geo-textile fabric. Any excess spoil will be removed from the ROW and disposed of properly off-site.

Generally, methods for minimizing short-term and temporary surface impacts to wetlands during construction include the implementation of vehicle and equipment exclusion fencing, erosion and sedimentation control measures, temporary construction matting, and implementation of the SWPPP included in the Project EM&CP. Erosion control barriers will be installed and maintained between upland construction areas and wetlands, as necessary, to prevent sedimentation into wetlands. Exposed soils will be planted and/or seeded to prevent soil erosion and sedimentation in nearby wetlands and surface waters from stormwater runoff.

As discussed in Section 4.1.4.4, cable joints and splices will be required along portions of the terrestrial transmission line, generally spaced approximately 2,000 ft apart, although distances will vary based on site-specific conditions; including cable pulling calculations, topography, available space, site access and conditions along the construction corridor, proximity to trenchless installations, and impact minimization measures. Installation of splice pits in unpaved areas will involve excavation of a pit that is approximately 30 ft long by 8 ft wide and approximately 8-10 ft deep with installation of concrete slabs at the bottom of each pit (see Sketch 5.1.300 in **Exhibit 5: Design Drawings)**. Cable ends are then pulled on the slab and a mobile splicing/jointing container is hoisted over the cables providing a safe consistent work environment for the cable jointing. When splicing/jointing works are complete, the container is removed from the location and the pit is backfilled around the cable with thermally and environmentally acceptable backfill. The Applicant will attempt to place all cable splices outside of wetlands to the extent practicable. However, if cable splices must be placed in wetlands, appropriate measures will be implemented to avoid permanent impacts to wetlands. Stockpiled suitable native wetland soil will be used for subsoil and topsoil backfill over the splice pits during restoration activities in wetlands. Doing so will facilitate wetland revegetation by maintaining local surface soil physical and chemical characteristics and replacing the local native seed bank. In addition, backfilling of splice pits and/or vaults will be followed by grading to pre-construction contours according to BMPs. This will be accomplished to maintain the overall extent of affected wetlands as well as their original site hydrology and flow circulation.

At other locations where the transmission line is installed under roads and other paved surfaces that are either in, or adjacent to, wetland areas, reinforced concrete manhole type splice vaults may be installed to house the cable joints as required. Works at vaulted installations will be like those of the direct buried splice pits except that the cables will be pulled into the vaults instead of onto a slab, and the joints will be applied inside the vault instead of the container environment. When splicing/jointing works are completed, the remaining backfill is applied around the vault and the wetland surface is restored to match pre-construction site conditions. At vault locations, only manhole covers will remain visible at the wetland surface. Sketch 5.1.300 and Sketch 5.1.302 in **Exhibit 5** show typical cross-sectional sketches of the manhole type splice vaults for HVDC and HVAC cables, respectively.

Both converter stations are sited exclusively in upland areas and will not result in impacts to wetland resources.

Prior to construction, the Applicant will obtain all required permits for activities in wetlands, including from USACE under Section 404 of the CWA. Mitigation for impacts to wetlands will be determined during the Section 404 permit application process in consultation with USACE and with NYSDEC during the Article VII certification process.

4.7.7.2 Tidal Wetlands Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.3, the terrestrial corridor on Croton Point is located within the 500-ft check zone of freshwater tidal wetland W-T28-039 (NYSDEC Wetland ID H-6). However, no portion of the regulated adjacent area of this wetland is within the proposed terrestrial project corridor (the corridor for the HDD for Landfall #3 does pass within the adjacent area, but no surface disturbance will occur in this segment of the project corridor).

As discussed in Section 4.7.3, the submarine corridor crosses approximately 5.2 miles of littoral zone tidal wetlands, and due to the very narrow strips of littoral zone tidal wetlands crossed, they only cover approximately 7.3 acres of the proposed submarine corridor. No NYSDEC-mapped tidal wetlands categorized as coastal fresh marsh; intertidal marsh; coastal shoals, bars and flats; or high marsh or salt meadow are crossed. At landfalls within the Hudson, Harlem, and East Rivers, the transmission line will be installed using HDD under littoral zone tidal wetlands in areas shallower than 6 ft (1.8 m) MLW. Project-related sediment disturbance in tidally influenced waterways would occur in waters deeper than 6 ft (1.8 m) MLW, outside of any tidal wetlands.

As discussed in Section 4.8.4, preliminary Project-specific modeling has been conducted to estimate potential total suspended solids (TSS) concentrations down current of the Project's in-water construction activities. The preliminary modeling results indicate the possibility of increased TSS in the littoral zone in or near the submarine corridor, depending on final route alignment and burial depth. The modeling will be revised following completion of a Project-specific sediment survey. If the revised modeling indicates that New York water quality standards may be exceeded within tidal wetlands, the Applicant will evaluate measures to reduce concentrations to the extent practicable and/or request a regulatory mixing zone to comply with New York water quality standards. Consequently, no adverse impacts to tidal wetlands are expected because of the Project.

4.7.7.3 Watersheds Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.4.1, the terrestrial transmission line corridor crosses five separate Class AAs watersheds (HUC level 12), with most of the crossings occurring in the New York City Watershed. Furthermore, there are 34 delineated streams within the portion of the corridor that crosses the New York City Watershed (see Attachment 5). The closest steam crossing to a reservoir occurs 2.5 miles upstream of Pepacton Reservoir as the corridor crosses an unnamed tributary to Bryden Hill Brook.

The Applicant understands that NYSDEC may require an Individual SPDES permit (per 6 NYCRR § 750-1.21(e)(1)(i)) for crossings that are in AA or AA-s watersheds and crossings of tributaries to AA or AA-s watershed. The Applicant will consult with NYSDEC to determine which portions of the Project area are eligible for an SPDES General Permit and which portions may require an Individual SPDES permit. The Applicant will also continue to coordinate with NYCDEP to ensure agreement and compliance regarding watershed crossings. Crossings of the Class AAs watersheds and the streams within the watersheds will be accomplished using methods for avoiding and minimizing impacts to the streams as well as to areas downstream of the crossings, in accordance with the Project's SWPPP which will be included in the EM&CP.

The transmission line corridor crosses the West Delaware Aqueduct and the Catskill Aqueduct (see Figure 4-4 in Attachment 1 to this Exhibit). Based on review of various online information, the aqueducts appear to range in depth from 300 ft (91 m) to 1,550 ft (472 m) below ground surface (Hofstra 2022; NYCDEP 2022; Catskill Archive 2022). Such depths would eliminate any potential direct impacts to the aqueducts from excavation of the approximately 5-foot-deep trench for the proposed transmission line. The Applicant will continue to consult with NYCDEP during Project design to identify any crossing-specific avoidance and minimization measures to ensure the integrity of the aqueducts are not affected. Crossing plans for these aqueducts will be included in the EM&CP.

4.7.7.4 Stream and Riverine Resources Potential Impacts and Proposed Mitigation

As noted in Section 4.7.4.2, the terrestrial transmission line corridor crosses 134 perennial, 78 intermittent, and 19 ephemeral streams. Of these, there are 199 minor stream crossings, 29 intermediate stream crossings, and 3 major stream crossings. Minor stream crossings, which represent 86% of all stream crossings, range from 1 ft to 10 ft (0.3 to 3 m). Combining all the minor stream widths provides an estimated average crossing width of 3 ft (1 m). Intermediate streams crossed by the terrestrial corridor range in width from 13 to 80 ft (4 to 24 m). The average width for intermittent stream crossings is 29 ft (9 m). The widths of major streams range from 105 to 250 ft (32 to 76 m), with an average of 177 ft (54 m).

As shown in Table 4-12, the Applicant has currently identified eight stream and two waterbody crossings where trenchless methods are the preferred crossing technique: the West Branch Delaware River, East Branch Delaware River, Beaver Kill, Mongaup River, Neversink River, Basher Kill, Monhagen Brook, and Wallkill River. The Applicant is in the process of consulting with NYSDEC regarding crossing methods for all State-regulated streams and wetlands within the Project area. The Applicant is also in the process of conducting and reviewing results of geotechnical investigations to assess the feasibility of trenchless crossings at numerous locations. The Final proposed crossing methods for all resources will be included in the EM&CP.

Potential impacts to streams from construction of the transmission line include potential for increased turbidity, higher sedimentation rates in downstream areas, changes in water quality (including reduced clarity in the water column, altered water chemistry, and changes in biochemical oxygen demand and pH), the introduction of drilling fluids as a result of inadvertent return from trenchless crossings, removal of in-stream aquatic and emergent vegetation, short-term and localized avoidance of the construction area by fish and other mobile aquatic organisms, and potential for loss of aquatic organisms that are less mobile or tend to stay in one place. Selection of appropriate crossing methods and the implementation of safeguards and BMPs in the vicinity of stream and river crossings will support avoidance and minimization of these impacts. Crossing methods for reducing impacts include open trenching under no flow/low flow steam conditions, dry ditching by diverting flows around construction areas to downstream locations, and trenchless methods such as HDD and jack and bore. Dry-ditch crossings can be completed quickly, typically less than 24 hours, which would result in short-term duration of construction and minimal impacts to minor streams. Trenchless methods avoid contact with streams by tunneling the transmission line below streambeds.

BMPs will include installation of erosion barriers along riparian corridors and between upland areas and streams. Vegetation clearing along stream banks will be limited to what is minimally required for construction. Soils and stream substrates will be stockpiled in locations away from streams to reduce the potential for sediment loading during rainfall events.

Staging and refueling of equipment, machinery, and vehicles will be set back from streams in accordance with required buffers identified through the permitting process. The Applicant's Spill Prevention Control and Countermeasures Plan, which will be included in the EM&CP, will describe measures to prevent and control adverse impacts and contamination due to spills and releases of hydraulic fluids, fuel, and other fluids. The Applicant will also prepare an Inadvertent Return Contingency Plan to address the inadvertent return of drilling fluids; the plan will be included in the EM&CP.

4.7.7.5 Groundwater Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.3, groundwater may be encountered during construction along portions of the terrestrial transmission line, particularly at wetland crossings where such crossings occur during the winter or spring months. If groundwater is encountered during construction, the Applicant will use appropriate BMPs to protect groundwater quality. For example, the transmission line trench may be plugged and dewatered as needed, and any groundwater encountered during construction will be discharged to well-vegetated upland areas, located well-away from mapped wetlands/streams/waterbodies to prevent any potential discharge and/or contamination, using properly constructed dewatering structures and/or geotextile sediment filter bags. Installation of French drains in the construction trench may also be used to facilitate drainage in addition to temporary settling ponds that may be constructed in upland areas as needed to discharge pumped trench water/groundwater for discharge through filter bags for further distillation. Groundwater is not expected to be encountered during construction at the northern and southern converter station sites due to the upland conditions of the sites and the Project's planned construction requirements. Any collection, pumping, or discharge of groundwater will be discussed in detail in the Project's SWPPP.

Trenchless installation methods for the transmission line, particularly HDD, will involve drilling greater than 20 ft (6.1 m) below the ground surface and in many cases through groundwater zones. The HDD installation method requires HDD drilling fluid, which typically consists of a water and bentonite mixture. For the protection of groundwater resources, any excess drilling fluid will be contained in a lined pit or containment pond, or trailer mounted portable tank, avoiding percolation to, and therefore contact with, groundwater. The bentonite mixture is made up of mainly inert, non-toxic clays and rock particles consisting predominantly of clay with quartz, feldspars, and accessory material such as calcite and gypsum; the mixture is not anticipated to significantly affect groundwater quality if released. An inadvertent return/release can occur when the drilling fluids migrate unpredictably to the land through fractures, fissures, or other conduits in the underlying rock or unconsolidated sediments. An inadvertent return/release could potentially increase turbidity in groundwater resources. Should an inadvertent return/release occur, it would likely only result in short-term and localized impacts. Finally, while subsurface disturbance via HDD will impact soils and other subsurface materials, groundwater would not be expected to be altered to a degree that would cause permanent diversion or compaction affecting the percolation of water.

The Applicant will implement measures to avoid and minimize the potential for construction activities to introduce pollutants to groundwater from the accidental discharge of petroleum or other chemicals. Such discharges could occur in the form of minor leaks from fuel and hydraulic systems, as well as more substantial spills that could occur during refueling or due to mechanical failures of construction equipment and other accidents. These risks will be minimized by measures like requiring the storage of all potential construction pollutants or contaminants in industry approved storage containers with 110% storage capacity and located in confined and lined storage locations at required setback distances from sensitive resources. Adherence to the Project's SPCC, SWPPP and EM&CP will further avoid and minimize potential impacts to groundwater from accidental discharges.

Blasting of shallow rock and bedrock may be required at some locations along the terrestrial transmission line. However, the proposed shallow installation design of 5 ft (1.5 m) for the transmission line, and potentially shallower installation in areas of shallower bedrock as discussed in **Exhibit 5**, will greatly

minimize the amount of blasting and bedrock/rock removal that is required along the corridor. In addition, the transmission line will be sited within the corridor to avoid shallow bedrock and rock outcropping areas to the greatest extent possible. Where blasting is required, groundwater flow in the immediate vicinity could be temporarily altered and there may be a short-term increase in groundwater turbidity. Blasting activities will be performed by a licensed professional adhering to strict guidelines to control energy release to the extent practicable. Charges for blasting will be kept to the minimum required to break up rock and bedrock. Where appropriate, mats made of heavy steel mesh or other comparable material, or trench spoil will be used to prevent scattering of rock and debris that result from blasting operations. The risk of disrupting and/or contaminating groundwater resources during construction blasting will be minimized by clearly flagging all mapped seeps and springs in the construction corridor and identifying the location of all shallow aquifers and/or groundwater wells (private and public) within 300 ft (91 m) of any planned blasting activities along the transmission line. Blasting activities will adhere to all industry standards relevant to controlled blasting and blast vibration limits.

As discussed in Section 4.7.3, 21 seeps and springs were identified within the terrestrial transmission line corridor in Sullivan and Delaware Counties (see Figure 6 of Appendix H to this Exhibit). The Applicant will make every practicable attempt to avoid direct impacts to seeps and springs during final engineering design of the transmission line route and workspace. If any seeps or springs cannot be directly avoided, specialized BMPs articulated in the Project SWPPP and EM&CP will be developed to maintain water flow and protect water quality. In areas of known groundwater resources, the Applicant will contact abutting landowners to identify any known seeps, springs, both within the construction corridor itself, as well as within 50 ft of any planned construction activities. Similarly, the Applicant will identify the location of any private wells within 50 ft (15.2 m) of the construction workspace by contacting abutting landowners and will employ measures to protect them as well. Such measures may include centerline adjustments within the proposed corridor, workspace neckdowns, and well monitoring during construction. The locations of wells and all seeps or springs used for drinking water along with sediment and erosion control protection measures which will be identified in the SWPPP and EM&CP.

Site restoration techniques, including those for soil compaction, will prevent localized impacts to groundwater recharge and permeability characteristics. Consequently, groundwater volume will not be affected by the Project.

During operations, the converter stations will contain oils, fuels, and/or lubricants. However, as the equipment will be mounted on foundations with associated secondary oil containment or located within buildings, an inadvertent release of oil at these facilities is not expected to impact the quality of the underlying groundwater. The Applicant will prepare an SPCC plan for the converter stations detailing spill prevention, control, and containment which will be included in the EM&CP.

4.7.7.6 Floodplains Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.4, the terrestrial transmission line corridor crosses approximately 4.4 miles of SFHAs almost all of which are Zones A and AE (Zone VE, coastal floodplain, is crossed for 105 ft [32 m]). Based on a typical and anticipated 50-ft-wide (12-m-wide) construction corridor, up to approximately 26.6 acres of SFHAs could be temporarily disturbed during construction of the transmission line. Transmission line construction activities in floodplains may include vegetation clearing, movement of equipment, trenching, and restoration. Since the transmission line will be installed underground and all disturbed areas will be revegetated, there will be no impacts to flood storage capacity in the FEMA mapped floodplain areas The Applicant will attempt to install all cable splices along the transmission line outside of SFHAs. However, if any cable splices are placed in floodplains the minimal footprint of the underground infrastructure (i.e., concrete slabs or vaults) will have no effect on flood storage either.

Approximately 0.4 acres of the southern converter station site is within SFHE Zone AE. Based on a flood zone evaluation completed by the Applicant, the design flood elevation is higher than the current grade at the site. Consequently, the site will either require site grading to raise the pad elevation to meet all applicable codes and regulations, or the design will need to include raised structures/floors. The design of the southern converter station will address New York City flood-resistant construction standards. Additional design details including flood hazard mitigation measures will be provided in the EM&CP.

Development within floodplains in New York State is governed by the requirements of local municipalities (e.g., town, city, or village) that participate in the National Flood Insurance Program. All construction proposed within SFHAs is subject to floodplain development regulations. Additional information on local ordinances, including those associated with floodplain development, and their applicability to the Project is provided in **Exhibit 7: Local Ordinances**.

Attachment L

Revised Exhibit 4 Redline

Response to Deficiency #10

4.10 Protected Species and Important Habitats

Pursuant to 16 NYCRR § 86.5, this section describes protected species and important habitats that have been observed, or have the potential to occur, in or near the Project area, and discusses potential impacts to those protected species and important habitats resulting from the construction, operation, and maintenance of the Project. This section also describes the proposed Project-specific measures proposed by the Applicant to avoid, minimize, and/or mitigate potential impacts to protected species and important habitats.

4.10.1 Protected Species and Important Habitats Studies and Analysis

Protected species and important habitats in the Project vicinity were reviewed using a combination of desktop analyses of publicly available data, technical reports, and scientific literature; targeted field surveys; and agency correspondence.

Protected species include species listed under the ESA, New York's State Endangered Species Act and its implementing regulations, ECL§ 11-0535 6 NYCRR Part 182, as well as other protections such as the Bald and Golden Eagle Protection Act of 1940, the Migratory Bird Treaty Act, the Marine Mammal Protection Act of 1972, and the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended. Important habitats include designated critical habitats under the ESA, EFH under the Magnuson-Stevens Fishery Conservation and Management Act, and other State-designated and mapped sensitive habitat areas.

A Natural Heritage Database inquiry was submitted to NYSDEC Division of Fish and Wildlife on August 9, 2021, to determine potential New York State and federally protected wildlife species likely to be present in or near the Project area, with a response received from the NYNHP on October 6, 2021 (Conrad 2021).

An official Species List was also obtained from the USFWS IPaC project planning tool to identify threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitats that may be present within or in the immediate vicinity of the Project area. Relevant agency correspondence is provided in Appendix A: Agency Correspondence to this Exhibit.

4.10.2 Protected Species in the Project Area: Existing Conditions

4.10.2.1 Terrestrial Wildlife and Plants Existing Conditions

Two federally and state-listed bat species (Rayman-Metcalf 2021; Conrad 2021) may occur within the terrestrial transmission line corridor:

- Indiana bat (*Myotis sodalis*) listed as endangered (42 FR 47840 47845, Recovery Plan: USFWS 2007); and
- Northern long-eared bat (*Myotis septentrionalis*) listed as threatened (80 FR 1900 1922, Recovery Plan: N/A).

Ten federally and/or state-listed T&E bird species (USFWS 2021; Conrad 2021) may occur within portions of the terrestrial and submarine corridors:

- Endangered roseate tern (*Sterna dougallii* [Northeast U.S. nesting population]) (52 FR 42064 42068, Recovery Plan: N/A);

- Threatened piping plover (*Charadrius melodus* [Atlantic Coast and Northern Great Plains populations]) (49 FR 44712, Recovery Plan: USFWS 1988, 2016);
- Threatened red knot (*Calidris canutus rufa*) (79 FR 73705 73748, Recovery Plan: USFWS 2021);
- State-threatened bald eagle (*Haliaeetus leucocephalus*) (USFWS 2022) (Conrad 2021);
- State-threatened northern harrier (*Circus hudsonius*) (Conrad 2021);
- State-threatened upland sandpiper (*Bartramia longicauda*);
- State-endangered peregrine falcon (*Falco peregrinus*);
- State-endangered golden eagle (*Aquila chrysaetos*) (USFWS 2022a);
- State-threatened pied-billed grebe (*Podilymbus podiceps*); and
- State-threatened least bittern (*Ixobrychus exilis*).

Two federally and/or state-listed threatened reptile species may occur within portions of the corridor:

- Threatened bog turtle (*Clemmys muhlenbergii*) (62 FR 59605 59623, Recovery Plan: USFWS 2001); and
- Threatened timber rattlesnake (*Crotalus horridus*) (Conrad 2021).

Two federally and state-listed endangered freshwater bivalve species may occur within portions of the terrestrial corridor:

- Endangered dwarf wedgemussel (*Alasmidonta heterodon*) (55 FR 9447 9451Recovery Plan: USFWS 1993); and
- Brook floater (*Alasmidonta varicosa*) (Primeau 2022).

Three federally and/or state-listed T&E plant species may occur within portions of the terrestrial corridor:

- Threatened seabeach amaranth (*Amaranthus pumilus*) (58 FR 18035 18042, Recovery Plan: USFWS 1996);
- Threatened small whorled pogonia (*Isotria medeoloides*) (47 FR 39827 39831, Recovery Plan: USFWS 1992); and
- Endangered musk root (*Adoxa moschatellina*) (Conrad 2021).

Sixteen additional state-listed T&E plants may occur in proximity to the submarine corridor (Conrad 2021):

- Threatened spongy-leaved arrowhead (Sagittaria montevidensis ssp. spongiosa);
- Endangered stalked bugleweed (*Lycopus rubellus*);
- Endangered New England bulrush (*Bolboschoenus novae-angliae*);
- Threatened eastern grasswort (*Lilaeopsis chinensis*);
- Threatened marsh straw sedge (*Carex hormathodes*);
- Threatened Davis' sedge (*Carex davisii*);
- Threatened smooth beggar ticks (*Bidens laevis*)

- Threatened clustered sedge (*Carex cumulata*)
- Threatened great plains flat sedge (*Cyperus lupulinus ssp. lupulinus*)
- Threatened violet wood sorrel (*Oxalis violacea*)
- Endangered water pigmyweed (*Crassula aquatica*)
- Endangered yellow flat sedge (*Cyperus flavescens*)
- Threatened terrestrial water starwort (*Callitriche terrestris*)
- Threatened annual saltmarsh aster (Symphyotrichum subulatum var. subulatum)
- Threatened single-glumed spike rush (*Eleocharis uniglumis*); and
- Endangered northern shore quillwort (*Isoetes septentrionalis*).

Bats

Indiana bat

The Indiana bat is listed as endangered both federally and in New York State by reference to the federal listings. The Indiana bat is a small mammal, roughly 2 inches long, weighing between 0.2 and 0.3 ounces. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines from about November through March. For hibernation, the bats require cool, humid caves with stable temperatures under 50°F but above freezing. Very few caves within the range of the species have these conditions. The hibernacula typically have large volumes of Indiana bats and often have large rooms and vertical or extensive passages (USFWS 2022). In spring, Indiana bats disperse from their winter hibernacula, some dispersing hundreds of miles. They feed solely on insects. During the summer, females congregate at nursery colonies, known as maternity roosts, to raise their pups in colonies of between 50 and 100. Maternity roosts are typically found in riparian zones, bottomland, floodplain habitats, wooded wetlands, and upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (USFWS 2007). Males spend their summer preparing for the fall breeding season. In August or early September, Indiana bats swarm outside the entrance of caves and mines, at which time mating occurs. Females store the sperm over the winter while they hibernate and fertilize the egg in the spring. In New York State, hibernation can start as early as September and extend nearly to June (NYSDEC 2022m).

USFWS defines Indiana bat known habitat, also known as "occupied habitat," as suitable habitat within a 2.5-mile radius around known roost trees, a 5-mile radius around acoustic survey occurrences and/or mist-netting captures without radio-telemetry data, a 5-mile radius of priority 3 and priority 4 hibernacula, and a 10-mile radius around priority 1 and priority 2 hibernacula (USFWS 2009). Suitable summer habitat for Indiana bats is defined by USFWS as a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 ft (305 m) of other forested/wooded habitat.

NYNHP indicates the Project is within proximity of Indiana bat maternity colonies in Sullivan and Orange Counties (Conrad 2021). Consultation with USFWS shows that approximately 20 known Indiana bat roost

trees occur within 2.5 miles of the terrestrial transmission corridor, all located within Orange County (Rayman-Metcalf 2021). In addition, the USFWS predictive model identifies several locations along the proposed corridor within Orange County from New York Route 30 to the Newburgh-Beacon Bridge, as well as the entire terrestrial transmission line corridor within Westchester County where Indiana bats may occur. No known Indiana bat hibernacula are proximate to the corridor (Rayman 2021), which from a regulatory perspective is defined as being no closer than 10 miles from priority 1 or priority 2 hibernacula, and no closer than 5 miles from a priority 3 or priority 4 hibernacula (USFWS 2009).

Northern long-eared bat

The northern long-eared bat (NLEB) is listed as threatened both federally and in New York State. Additionally, the species is currently proposed for federal reclassification to endangered status (87 FR 16442), for which the final determination is expected in November 2022. NLEB typically weigh between 0.2 and 0.3 ounces and have a wingspan of 9 to 10 inches. During the winter months, NLEBs hibernate in caves and mines with large passages and entrances, constant temperatures and high humidity, and no air currents. During the summer months, they roost in a variety of shelters, including under tree bark, in cavities, or in crevices of both live and dead trees, rarely roosting in structures such as barns and sheds. They are considered to be more solitary than other members of the Myotis genus and are typically found in groups containing less than 100 individuals, with maternity colonies averaging 20 to 30 individuals. Pups are typically born between late May and late July, becoming volant (able to fly on their own) 18 to 21 days after birth. NLEB typically forage on forested hillsides and ridges rather than in streamside and floodplain forests. They also feed by gleaning motionless insects off vegetation and water (Harvey et al. 2011; USFWS 2015). In New York, prior to 2006, NLEB were frequently detected in the forests of every county of the state except for the five counties of New York City (NYSDEC 2022n).

USFWS defines NLEB known habitat, also known as "occupied habitat," as suitable habitat within a 1.5-mile radius around known roost trees, a 3-mile around acoustic survey occurrences and/or mist-netting captures without radio-telemetry data, and a 5-mile radius of known hibernacula (USFWS 2014). USFWS defines suitable summer habitat for NLEB as a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 ft (305 m) of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat.

NYNHP indicates the Project is within proximity of NLEB hibernacula within Sullivan and Orange Counties (Conrad 2021). Through consultation with USFWS, it was determined that there are no NLEB roost trees known to occur within 1.5 miles of the terrestrial transmission line corridor; however, two acoustic survey records occur within 2 miles of the corridor in Sullivan County and one acoustic survey record is within 0.5-mile of the corridor in Orange County. In addition, one known NLEB hibernaculum and occurring capture is within 5 miles of the corridor in Orange County (Rayman-Metcalf 2021). Besides these areas known to contain NLEB, the USFWS predictive model identifies the portion of the proposed corridor between NY Route 30 in Hancock and the Newburgh-Beacon Bridge as having the potential to have NLEB present (Rayman-Metcalf 2021).

Birds

Roseate tern

The northeast U.S. nesting population of roseate tern is listed as endangered both federally and in New York State. In northeastern North America, more than 90% of the breeding population is concentrated into a few colonies between Cape Cod and Long Island. In the northeastern United States, they nest on small islands with the common tern (*Sterna hirundo*) (NatureServe 2022). In New York State, this species breeds only in a few Long Island colonies, primarily Great Gull Island, which accounts for approximately 87% of the New York State population (NYSDEC 2022o). The terns begin to arrive at the breeding grounds at the end of April with the earliest eggs typically being laid in the third or fourth week of May. A complete clutch is typically 2 to 3 eggs. In the New York-Massachusetts area, young are fed almost exclusively American Sand Lance (*Ammodytes americanus*) (Spendelow 1995). The terns typically forage over open water, often in tidal channels, tide rips, drift lines, or over shoals/sandbars (NatureServe 2022).

Portions of the terrestrial transmission line corridor in Queens and the Randall's Island East and Lawrence Point landfalls are within the range of the roseate tern (USFWS 2022). However, no portions of the corridor or landfall sites contain sandy beach habitat that would support roseate tern nesting. As such, any roseate tern present in the Project area would be limited to transient individuals searching for or utilizing open water foraging areas.

Piping plover

The Atlantic Coast and Northern Great Plains populations of piping plover are listed as federally threatened and as endangered in New York State. They occur along the Atlantic Coast from southwestern Newfoundland and southeastern Quebec south to North Carolina, and on inland beaches from eastern Alberta and Nebraska to Lake Ontario. Within New York, this species breeds on Long Island's sandy beaches from Queens to the Hamptons, in the eastern bays and in the harbors of northern Suffolk County. (NYSDEC 2022p) They are small shorebirds that weigh between 1.5 and 2.25 ounces and measure between 5.5 and 7 inches long. During breeding season, they have a black band on their neck and forehead and their beak becomes orange with a black tip. They begin to arrive in the breeding grounds in New York around March and stay through August when they migrate to their wintering grounds. Between May and June, the females will normally lay four and sometimes up to five eggs (Audubon n.d.[a]). They forage on a broad range of invertebrates, such as worms, insect larvae, beetles, and small shellfish. The piping plovers that breed in the New York City area primarily winter in South Carolina (Wildlife NYC 2022).

Portions of the proposed terrestrial transmission line corridor in Queens and the Lawrence Point landfall and southern converter station sites are within the range of the piping plover (USFWS 2022). However, no portions of the corridor or landfall sites contain sandy beach habitat that would support piping plover nesting. As such, any piping plover present in the Project area would be limited to transient individuals flying overhead or using open water to forage.

Red knot

The red knot is listed as federally threatened and as endangered in New York State. They breed in the Canadian artic and most individuals winter at the southern tip of South America. In New York, red knot occurs along the salt meadows and mudflat of the South Shore of Long Island in both spring and fall, numbering more than 1,000 individuals; they are also present on Long Island in winter. Red knot was listed as federally threatened in 2014 due to declines in horseshoe crab populations, and to challenges resulting from climate change and coastal development (NYSDEC 2022j).

Portions of the proposed terrestrial transmission line transmission corridor in Queens and the Lawrence Point landfall and southern converter station sites are within the range of red knot (USFWS 2022). However, no portions of the corridor or landfall sites contain salt meadows or mudflat habitat that would support red knot presence.

Bald eagle

The bald eagle is a state-listed threatened species. Although no longer federally listed as threatened (USFWS 2007), bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). Bald eagles prefer undisturbed areas near large lakes and reservoirs, marshes and swamps, or stretches along rivers where they can find open water and fish. Wintering grounds are from southern Canada south, along major river systems, in intermountain regions, and in the Great Plains (NYSDEC 2022q).

According to bald eagle NYNHP data provided by NYSDEC, the terrestrial transmission line corridor crosses two known winter bald eagle concentration areas, one along the Neversink River and a second on Croton Point Peninsula. The proposed submarine transmission line corridor crosses three separate known winter bald eagle concentration areas and is just outside a fourth. The known winter bald eagle concentration areas that are crossed are the perimeter of Constitution Island, the entire stretch of the Hudson River from the Bear Mountain Bridge to Indian Point, and off the tip of Croton Point Peninsula. The proposed submarine transmission line corridor is less than 200 ft (61 m) outside a known winter bald eagle concentration off Sloop Hill State Unique Area in Cornwall-on-Hudson (Sandrow 2022). Observations of bald eagles have also been reported in other portions of the transmission line corridor including New York City, northern Manhattan, western Bronx, and Randall's Island (eBird 2022a).

According to bald eagle NYNHP data provided by NYSDEC, no documented bald eagle nests are located within the proposed terrestrial transmission line corridor. Three nests, two of which were active in the most recent dataset, are located within 1 mile of the proposed terrestrial transmission line corridor: two are near the Newburgh-Beacon Bridge landfall (approximately 0.5 miles from the corridor), one of which was active in the most recent dataset while the other is a previous nest of the same pair of birds, and another on Croton Point Park (approximately 0.25 miles from the corridor). Ten nests, six of which were active in the most recent dataset, are located within 1 mile of the submarine transmission line corridor: nine of which are more than 0.5 miles from the corridor, while one active nest is approximately 300 ft (91 m) from the submarine transmission line corridor near Manitou Marsh.

Northern harrier

The northern harrier is listed as state threatened. Northern harrier nests are found in dense vegetation or situated in a slightly elevated position. The clutch averages five eggs. Northern harriers breed in North America from northern Alaska and Canada south to central and southern California, Mexico and portions of the southern United States excluding the southeast region. Breeding occurs in freshwater and brackish marshes, tundra, fallow grasslands, meadows, and cultivated fields (NYSDEC 2022r).

NYNHP data indicate northern harriers may occur along the terrestrial transmission line corridor in Orange County (Conrad 2021). Northern harriers typically use fields or other suitable habitat that are greater than 25 acres of contiguous habitat. Such areas do not occur along the NYPA Marcy South ROW portion of the corridor in Orange County. It is unlikely that northern harriers would use the section of the corridor within the I-84 median due to the long, narrow nature of the highway corridor and extensive adjacent traffic, or the remainder of the Project corridor due to absence of suitable habitat. In addition, during agency consultation it was determined that grassland bird surveys were not necessary because the transmission line will have no permanent impact on habitat, which will be restored after construction.

One incidental northern harrier observation was made within the corridor on November 11, 2021, during wetland surveys. A female northern harrier was observed at two separate instances about 5 minutes apart flying along the edge of a small agricultural field, exhibiting foraging behavior, along the edge of the NYPA ROW in Ferndale, New York. Furthermore, eBird has documented numerous contemporary northern harrier sightings in the vicinity of the proposed corridor at the Croton Point Park in Westchester County. These sightings have occurred throughout the year but consist primarily of spring, fall, and winter observations, with few if any observations recorded during the breeding season (eBird 2022b). The landfill cap on Croton Point Park adjacent to the proposed corridor as well as surrounding wetlands provide suitable nesting habitat for this species.

Upland sandpiper

The upland sandpiper is listed by New York State as threatened. It leaves New York for wintering grounds by mid-September. The bird has a breeding range that extends from southern Canada through the central plains, from the Rocky Mountains east to the Appalachian Mountains. Populations in the northeastern United States are declining due to loss of grassland habitats (NYSDEC 2022s).

NYNHP data indicate upland sandpipers may occur along the terrestrial transmission line corridor in Orange County (Conrad 2021). Upland sandpipers typically use fields or other suitable habitat that are greater than 25 acres of contiguous habitat. Such areas do not occur along the NYPA Marcy South ROW portion of the corridor in Orange County. It is unlikely that upland sandpipers would use the section of the corridor within the I-84 median due to the long, narrow nature of the highway corridor and extensive adjacent traffic, or the remainder of the Project corridor due to absence of suitable habitat. In addition, during agency consultation it was determined that grassland bird surveys were not necessary because the transmission line will have no permanent impact on habitat, which will be restored after construction.

eBird has historical observations of upland sandpipers at Croton Point Park. The most recent sightings were from September 10, 2020; August 17 and 18, 2019; July 27, 2015; and April 13, 2012 (eBird 2022c). These sparse sightings indicate that upland sandpipers are only occasional visitors to Croton Point Park.

Peregrine falcon

The peregrine falcon is listed by New York State as endangered. Nesting areas are typically an unlined scrape on a cliff ledge or rocky outcrop. They may use abandoned raven or hawk nests as well as man-made structures such as bridges and tall buildings. The bird primarily feeds on birds ranging in size from medium-size songbirds up to small waterfowl. The current peregrine falcon range includes the Adirondacks; the New York City area on buildings and bridges; the Hudson Valley on bridges and cliffs; and scattered urban sites in Rochester, Buffalo, Binghamton, and Albany on buildings and bridges. The range has expanded in recent years (NYNHP 2022a).

According to NYNHP data, the peregrine falcon is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur along the length of the submarine corridor and in adjacent areas, particularly along the Hudson River shoreline and on bridges.

Golden eagle

The golden eagle is a state-listed endangered species, and it prefers remote mountainous areas with open habitat where small game is abundant, and cliffs are available for nesting. One area in Dutchess County has been consistently occupied by 1 to 4 wintering eagles since the early 1970s, and another was found more recently (NYNHP 2022b).

According to NYNHP data, the golden eagle is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur along the length of the submarine corridor and in adjacent areas, particularly along the Hudson River shoreline and on bridges. Additionally, USFWS provided radio telemetry data that show numerous golden eagles are documented crossing the proposed terrestrial transmission line corridor in Delaware and Sullivan Counties (Sullivan 2022).

Pied-billed grebe

The pied-billed grebe is listed as threatened by New York State. The bird inhabits quiet marshes, marshy shorelines of ponds, shallow lakes, or marshy bays. A mix of emergent vegetation and open water is ideal for this species. As a breeding species, the pied-billed grebe occurs statewide, with concentrations on the Lake Ontario Plain and St. Lawrence Valley. It is more sparsely distributed in the Adirondacks, Catskills, Allegheny uplands, and on Long Island. Areas of high winter concentrations include southern and central Texas, Great Salt Lake, Lake Mead, and the San Joaquin Valley. The highest overall counts of wintering grebes occurs on the Tennessee River in northeastern Alabama. It is a rare but regular winter visitor, more common on the coast, but also lingering fairly regularly in open water areas on the Allegany and Oswego Rivers, and at Dunkirk Harbor in Chautauqua County (NYNHP 2022c).

According to NYNHP data, the pied-billed grebe is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. No suitable habitat for this species is present on or in immediate proximity to any of the landfall sites.

Least bittern

The least bittern is listed as threatened by New York State. The least bittern spends most of its time in dense grass-like vegetation and subsists on small fish, salamanders, tadpoles, frogs, leeches, slugs, crayfishes, dragonflies, shrews, and mice. In New York, least bitterns tend to breed in shallow or deep emergent marshes, freshwater tidal marshes (lower Hudson River), or brackish tidal marshes (Long Island). They prefer stands of cattails or bulrush with bur-reed, sedges, or common reed. Least bitterns are restricted to the Lake Ontario and St. Lawrence plains and the Lower Hudson River Valley with some records from Long Island (NYNHP 2022d).

According to NYNHP data, the least bittern is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. No suitable habitat for this species is present on or in immediate proximity to any of the landfall sites.

Reptiles

Bog turtle

The bog turtle is listed as federally threatened and as endangered in New York State. Bog turtles are New York's smallest turtle, reaching a length of 4.5 inches. Bog turtles emerge from overwintering sites by mid-April. Overwintering sites are typically found in densely vegetated areas often in association with tree roots and other submerged structures along streams or underground springs. Abandoned muskrat lodges and other wetland burrows may be used. Bog turtles emerge when air and water temperatures exceed 50 degrees Fahrenheit. The bog turtle is found in scattered separate colonies in the eastern United States from New York and eastern Massachusetts, south to eastern Tennessee and northwestern Georgia. The species is semi-aquatic preferring habitat with cool, shallow, slow-moving water with deep mucky soils, and tussock-forming vegetation (NYSDEC 2022t).

Through consultations with USFWS, it was determined that bog turtles may be present in two distinct portions of the terrestrial transmission line corridor in Orange County. The first area is between US209 in Cuddebackville and Pocototello Road in Middletown (excluding areas above 1,000 ft [305 m] in elevation). The second area is along the I-84 corridor started just east of the Goshen Turnpike in Walkill to NY-17 in Newburgh (Rayman-Metcalf 2021). USFWS recommended Phase 1 bog turtle habitat surveys in these portions of the corridor.

The Applicant conducted Phase I bog turtle habitat surveys in the above areas in March and the first half of April 2022. Two wetlands were found to contain suitable bog turtle habitat (LaBella 2022). The Applicant then conducted a Phase 2 presence/absence survey of these wetlands in late April and May 2022. Consistent with the USFWS protocols, the two wetlands were each searched for over five hours on four separate occasions under favorable weather conditions, greater than 55º F under sunny or cloudy conditions. Surveys may be done when it is sunny or cloudy. Surveys can be conducted during and after light rain, provided air temperatures are above 65º F. Surveys were conducted on April 22, May 5, 10, and 17, 2022. No bog turtles were found to be present in either wetland (LaBella 2022). As such, bog turtles are not expected to be present within the terrestrial transmission line corridor. The Phase I and II bog turtle survey reports are provided in Appendix J: Bog Turtle Survey Reports to this Exhibit.

Timber rattlesnake

The timber rattlesnake is listed by New York State as threatened (NYSDEC 2022u). They are active between late April and mid-October. Mating season begins in the early summer and continues into early fall. During this time, males are especially active and can be found using basking and gestating habitat looking for receptive females. Timber rattlesnakes give birth to live young following a gestation period of 4 to 5 months. Females give birth every 3 to 5 years between late August and mid-September. Timber rattlesnakes are long-lived and reproduce at a low rate, making for slow population growth (NYSDEC 2022u). Their habitat includes mountainous and hilly deciduous or mixed deciduous- coniferous forests often with rocky outcroppings, steep ledges, and rockslides. This species' preferred habitat for basking, shedding, gestating, and birthing is open canopy and rocky areas while their preferred habitat for foraging is generally within forested habitat surrounding the den.

NYNHP data indicate timber rattlesnakes may occur along the terrestrial transmission line corridor in Sullivan County (Conrad 2021). The existing NYPA Marcy South ROW in Sullivan County has the potential to provide suitable denning, gestation, and denning habitat for timber rattlesnakes because of the open nature of the cleared ROW as well as the rocky outcroppings present. Based on the New York State Amphibian and Reptile Atlas, timber rattlesnakes are most likely present in the southeastern portion of Sullivan County (NYSDEC 2022v). During consultation with NYSDEC, the Applicant indicated that no timber rattlesnake surveys would be conducted, but rather construction monitors would be employed within NYNHP timber rattlesnake buffer areas.

Bivalves

Dwarf wedgemussel

The dwarf wedgemussel (DWM) is listed as endangered at both the state and federal levels. DWM are small freshwater mussels that rarely exceed 1.5 inches in length. They spend most of their time almost completely buried in the bottom of streams. Habitat for the DWM includes running water of all sizes. Preferred bottom substrates include silt, sand, and gravel and stream flow velocity, where present, is usually slow to moderate. The species appears to select or at least be tolerant of low levels of calcium in the water (NYSDEC 2022w).

USFWS and NYSDEC identified the Neversink River and Basher Kill crossings as the two crossings of concern for DWM during meetings on December 7, 2021, and January 5, 2022. Both agencies recommend that surveys should be completed for these waterbodies as part of the consultation process. The Applicant plans to conduct mussel surveys for these crossings during the appropriate time prior to construction. The Applicant will continue consulting with USFWS and NYSDEC regarding DWM survey timing and protocols.

Brook floater

The brook floater is listed by New York State as threatened (NYNHP 2022e). Brook floaters are small subtrapezoidal to subovate mussels. The outermost shell is greenish, with dark green color rays. The inner shell is bluish white. Like many bivalves, The outermost shell is greenish, with dark green color rays. The inner shell is bluish white. Like many bivalves, brook floater are small freshwater mussels that rarely exceed 1.5 inches in length. They spend most of their time almost completely buried in the bottom of streams. Habitat for the brook floater is strictly a running water, favoring gravelly riffles in creeks and small rivers. Larvae (glochidia) of this species are parasitic on the gills of several fish species including Blacknose and Longnose Dace, Golden Shiners, Pumpkinseeds, Yellow Perch, Slimy Sculpins, and the Margined Madtom. Adults are filter feeders (NYNHP 2022e).

NYSDEC identifies the East Branch of the Delaware River, Beaverkill, and Neversink River crossings as the three crossings of concern for brook floater (Primeau 2022). NYSDEC recommends that surveys should be completed for these waterbodies as part of the consultation process. The Applicant plans to conduct mussel surveys for these crossings during the appropriate time prior to construction. The Applicant will continue consulting with NYSDEC regarding brook floater survey timing and protocols.

Plants

Seabeach amaranth

This plant is listed as threatened at both the federal and state levels. Seabeach amaranth occurs on barrier island beaches between the foredune and wrack line and on open overwash areas behind the foredune. Its range in New York is restricted to Long Island from Coney Island to near the east end of the South Fork along the south shore (NYNHP 2022f). Based on field reconnaissance surveys, no suitable habitat for this species is present within the transmission line corridor or at the landfall sites.

Small whorled pogonia

The small whorled pogonia is federally and state listed as threatened. The species grows in a variety of upland, mid-successional, wooded habitats, usually older hardwood and mixed stands of beech, birch, maple, oak, and white pine. It prefers acidic soils with a thick layer of dead leaves and sparse to moderate ground cover and often occurs on slopes near small streams (USFWS 2022).

Small whorled pogonia was identified by USFWS as potentially occurring in Orange County (Rayman-Metcalf 2022). USFWS indicates that presence/absence surveys should be completed for small whorled pogonia in any portions of the Project in Orange County where upland forest with open understory will be cleared. The Applicant will complete presence/absence surveys for small whorled pogonia in Orange County, as necessary, once construction workspace has been developed and if the need for any clearing of suitable habitat is identified. Per USFWS guidelines, the surveys will be conducted during the flowering period of mid-May to mid-June.

Musk root

Musk root is listed as endangered by New York State. Musk root is a clump forming plant of moist rocks often near the base of cliffs in rich woods, around cold air vents along lower portions of talus slopes, on red sandstone ledges and hillsides and in shallow soil on rock ledges. In New York State, musk root is only known from three populations in the Catskill Mountains (NYNHP 2022g).

NYNHP data indicate the terrestrial transmission line corridor bisects one of the three known populations in New York State in Delaware County on Trout Brook Mountain in a hemlock-northern hardwood forest (Conrad 2021). The record for this element occurrence is from 1985, with no additional observations since that time (Conrad 2021; Ring 2022). The 1985 observations coincide with pre-construction surveys performed for the NYPA Marcy South transmission line which was constructed in 1986.

The Applicant completed field surveys in May and June 2022 to determine presence/absence of musk root in the area identified by NYSDEC NYNHP in proximity to the corridor. None of the hemlock-northern hardwood forest community type referenced in the NYNHP response was observed within or adjacent to the corridor near the edge of the NYPA ROW. Further, while some of the associated species identified by the NYNHP as growing in proximity to musk root (NYNHP 2022g) were observed, such as striped maple (*Acer pensylvanicum*), wild sarsaparilla (*Aralia nudicaulis*), black birch (*Betula lenta*), prickly gooseberry (*Ribes cynosbati*), and elderberry (*Sambucus canadensis*), no musk root populations were identified. The Applicant's surveyors consulted with NYSDEC's chief botanist to evaluate potential musk root identifications. All plants identified by the field surveyors as possible musk root were confirmed by the state botanist to be other species (Ring 2022). According to NYSDEC, musk root is most likely to be present in shaded, protected microhabitats (Ring 2022), and although it is possible to be found in some spots on the NYPA ROW, it would more likely be within the forested area. Based on the survey conducted in 2022, musk root does not appear to be present within the NYPA Marcy South ROW. If additional workspace is required outside the NYPA Marcy South ROW, additional surveys may be warranted.

Spongy-leaved arrowhead

The spongy-leaved arrowhead is listed as threatened by NYSDEC. This plant is an annual herbaceous plant that grows in tidally flooded areas. The plant is often entirely above water at low tide and mostly or entirely submerged at high tide. The species is found in freshwater to brackish intertidal mud flats. In New York, the species is restricted to estuaries along the Hudson River from south of Albany to north of the Mario Cuomo Bridge (NYNHP 2022h).

According to NYNHP data, spongy-leaved arrowhead is potentially present along the Hudson River Shore below Camp Smith as well as along the mouth of Moodna Creek at the Hudson River, West Point Military Academy, Constitution Marsh, and Iona Island Marsh. The submarine corridor is greater than 700 ft (213 m) away from each of these locations.

Stalked bugleweed

Stalked bugleweed is listed as endangered by New York State. This plant is found in marshes, fens, and flooded swamps. In New York the species is extant in the Lower Hudson Valley and Long Island (NYNHP 2022i).

According to NYNHP data, stalked bugleweed is potentially present at West Point Military Academy, west of the railroad track. The submarine corridor is greater than 100 ft (30 m) from this known population.

New England bulrush

New England bulrush is listed as endangered by New York State. This plant is found in brackish marshes along tidal creeks and rivers. This species occurs from western Long Island and New York City to the lower Hudson River Valley (NYNHP 2022j).

According to NYNHP data, New England bulrush is potentially present at Con Hook tidal marsh and mudflats, Iona Island Marsh, and Croton River. The submarine corridor is approximately 500 ft (152 m) east of Con Hook tidal marsh and mudflats, 1/3-mile northeast of Iona Island Marsh, and 1.5 miles southwest of the Croton River.

Eastern grasswort

Eastern grasswort is listed as threatened by New York State. This species occurs in brackish marches, intertidal mudflats, borders of salt marshes and other muddy locations with brackish or salt water influences. The plant is found on brackish areas of the Hudson River and eastern Long Island (NYNHP 2022k).

According to NYNHP data, the species is potentially present at Con Hook, Piermont Marsh, and along Croton River. The submarine corridor is approximately 500 ft (152 m) east of Con Hook tidal marsh and mudflats, nearly a mile from the Piermont Marsh, and approximately 1.5 miles from the Croton River.

Marsh straw sedge

Marsh straw sedge is listed as threatened by New York State. This plant usually occurs in and adjacent to salt and brackish coastal tidal marshes. Rarely, it is found within slightly inland tidal marshes. Specifically, it occurs on dune swale and on dry or wet sands. It can also be found in fens, margins of wetlands and wet forests adjacent to the coast. The species occurs adjacent to the ocean mostly throughout Long Island and parts of New York City. There are two additional populations just north of New York City along the Hudson River (NYNHP 2022l).

According to NYNHP data, marsh straw sedge is potentially present at Con Hook tidal marsh and mudflats, which is approximately 500 ft (152 m) east of the submarine corridor.

Davis' sedge

Davis' sedge is a state-listed threatened species. This species occurs in mesic limestone, rich bottomland, and floodplain forests as well as wet meadows and open gravel bars of large rivers. Plants can occur or sometimes be restricted to disturbed areas. In New York, the species occurs adjacent or relatively near the Hudson River from just north of Albany south to Queens (NYNHP 2022m).

According to NYNHP data, Davis' sedge is potentially present at Denning Point. At its closest point, the submarine corridor is located about 2/3-mile west of Denning Point.

Smooth beggar ticks

Smooth beggar ticks is a state-listed threatened species. This species is found primarily in freshwater and brackish tidal mud flats and tidal marshes. In New York, the species occurs on Long Island and along the Hudson River (NYNHP 2022n).

According to NYNHP data, smooth beggar ticks is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Clustered sedge

Clustered sedge is a state-listed threatened species. This plant is found in open rocky habitats, particularly in damp areas of acidic bedrock or shallow soil. The species is also found in various successional habitats. In New York, the plant is primarily found in the Champlain Valley and Hudson Valley. The majority of the plants in New York are found in the Shawangunk Mountains (NYNHP 2022o).

According to NYNHP data, clustered sedge is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Great Plains flat sedge

Great Plains flat sedge is a state-listed threatened species. This plant has been found in sandy soils at beaches, railroads, roadsides, and pastures. In New York, the plant is mainly found on Long Island with a few collections from the Hudson Valley as far north as Albany County (NYNHP 2022p).

According to NYNHP data, Great Plains flat sedge is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Violet wood sorrel

Violet wood sorrel is a state-listed threatened species. This plant is found primarily on steep rocky slopes and open summit, generally on rocky, often rich soils. The current locations for the species are the Hudson Valley from Columbia County south. It is also found on Long Island (NYNHP 2022q).

According to NYNHP, violet wood sorrel is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Water pigmyweed

Water pigmyweed is a state-listed threatened species. This plant occurs in tidal mud flats, marshes and rocky shores usually in the intertidal zone. In New York the species is found on Long Island and the Lower Hudson Valley (NYNHP 2022r).

According to NYNHP data, water pigmyweed is potentially present at Iona Island Marsh and along the Croton River. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh and 1.5 miles southwest of the Croton River.

Yellow flat sedge

Yellow flat sedge is a state-listed endangered species. This plant occurs at wet sandy sites including salt marshes, coastal plain pond shores, and wet, sandy, weedy roadsides. Yellow flat sedge occurs in southeastern New York, from as far north as Orange County through parts of the New York City area and Long Island (NYNHP 2022s).

According to NYNHP data, yellow flat sedge is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Water starwort

Water starwort is a state-listed threatened species. This plant requires bare, muddy ground and has been found at mud flats, pastures, pond shores, driveways, and both upland and wetland forests. In New York, the species is found in the Hudson Valley from Rockland County north to Columbia County. One site is also present on Long Island (NYNHP 2022t).

According to NYNHP data, water starwort is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Annual saltmarsh aster

Annual saltmarsh aster is a state-listed threatened species. This plant occurs in coastal areas in salt to brackish marshes. Along the banks of salt influenced tidal channels and creeks, shrub dominated salt influenced habitats, edges of salt ponds, wet brackish swales in maritime dunes, and in disturbed habitats that are salt influenced. In New York, the species is found on the shores of Long Island west to Brooklyn and Staten Island and north along the edges of the Hudson River to Putnam and Rockland Counties (NYNHP 2022u).

According to NYNHP data, annual saltmarsh aster is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Single-glumed spike rush

Single-glumed spike rush is a state-listed threatened species. This plant occurs in or near salty or brackish water usually at the margin of fluctuating shorelines. In New York, single-glumed spike rush is known from Long Island, New York City, and the Lower Hudson River north to Orange County (NYNHP 2022v).

According to NYNHP data, single-glumed spike rush is potentially present along the Hudson River shore at the base of Dundenberg Mountain. At its closest point, the submarine corridor is located about 800 ft (244 m) east of the base of Dundenberg Mountain.

Northern shore quillwort

Northern shore quillwort is a state-listed endangered species. This plant is mostly found in submerged aquatic settings but can also be found in shoreline areas where the roots may be in wet soil and the leaves are fully exposed to air. Its habitat includes pond margins, cobble shorelines of large rivers, tidal mudflats, and shallow gravelly areas of lakes (NYNHP 2022w).

According to NYNHP data, northern shore quillwort is potentially present along the Croton River. At its closest point, the submarine corridor is located about 1.5 miles southwest of the Croton River mouth.

4.10.2.2 Marine Species Existing Conditions

Two federally and state-listed endangered fish species (NOAA GARFO 2019, NYSDEC 2015) occur within the proposed submarine transmission line corridor:

- Atlantic sturgeon (*Acipenser oxyrinchus* [New York Bight Distinct Population Segment (DPS)]) (77 FR 5880 and 77 FR 5914, Recovery Plan: N/A); and
- Shortnose sturgeon (*Acipenser brevirostrum*) (32 FR 4001, Recovery Plan: NOAA Fisheries 1998).

Four species of federally and state-listed T&E sea turtle species (NOAA GARFO 2019, NYSDEC 2015) may seasonally occur within portions of the proposed submarine transmission line corridor:

- Endangered Kemp's ridley turtle (*Lepidochelys kempii*) (35 FR 18319, Recovery Plan: NOAA Fisheries et al. 2011);
- Endangered leatherback turtle (*Dermochelys coriacea*) (35 FR 849, Recovery Plan: NOAA Fisheries & USFWS 1992);
- Threatened loggerhead turtle (*Caretta* [Northwest Atlantic DPS]) (76 FR 58868, Recovery Plan: NOAA Fisheries & USFWS 2008); and
- Threatened green turtle (*Chelonia mydas* [Northwest Atlantic DPS]) (81 FR 20057, Recovery Plan: NOAA Fisheries & USFWS 1991).

Atlantic Sturgeon

The Atlantic sturgeon (New York Bight DPS) is listed as endangered both federally and in New York State by reference to the federal listings (NYSDEC n.d.[d]; NOAA GARFO 2019). Atlantic Sturgeon are born in freshwater, then migrate to the sea. Once mature, they may return to their natal freshwater rivers to spawn (Bain et al. 1998). The majority of the action area is within the Hudson River which is Critical Habitat for the Atlantic sturgeon (NOAA GARFO 2019).

Atlantic sturgeon are present in the action area in the adult life stage foraging and migrating between upstream spawning sites and the Atlantic Ocean as well as the subadult life stage foraging from the mouth of the Hudson River north to the Troy Dam (NOAA GARFO 2019). Both life stages are expected to be present in the Hudson during similar time frames from April through November (NOAA GARFO 2019). Spawning in the Hudson River occurs in freshwater reaches within in-channel or off-channel habitats from late April through late July (NOAA Fisheries 2020). Known spawning areas occur north of the survey area near Hyde Park, NY (RM 80) and Catskill, NY (between RM 110 and 115; NOAA Fisheries 2020). Spawning has not been documented south of RM 70, which is near Crown Heights, Poughkeepsie, NY (Van Eenennaam et al. 1996; Bain et al. 1998; NOAA GARFO 2019). Evidence suggests that females do not feed during spawning runs in freshwater (Bain et al. 1998). Male and female Atlantic sturgeon have been observed to enter the river at different times and the sexes exhibit differing lengths of stay throughout the spawning season (Breece et al. 2021). Male sturgeon enter the Hudson starting in April and remain as late as November (NOAA GARFO 2019). During their upstream migration, males typically stay in water greater than 7.6 m (25 ft) deep. In contrast, female adult Atlantic sturgeon enter the Hudson River for spawning beginning in mid-May and return to open marine habitats quickly after spawning (NOAA GARFO 2019). Breece et al. (2021) found that mean arrival day for adult Atlantic sturgeon in the Hudson River at RM 31 for females was June 3 and May 23 for males. Within the same sex, arrival dates had less variability than departure dates. Mean departure dates were calculated to be July 10 for females and July 12 for males. Adult Atlantic sturgeon were also detected migrating through the East River (Tomichek et al. 2014).

After their first year, juvenile Atlantic sturgeon become gradually more tolerant to saline waters and are present within portions of the survey area year-round as they migrate and forage (NOAA GARFO 2019). Tracking data from tagged juvenile Atlantic sturgeon indicate that during the spring and summer, individuals are most likely to occur within RM 37 to 106; Morris 2022). During summer occupation, juvenile Atlantic sturgeon are known to inhabit deep-water habitats including the navigation channel. During winter months, most juveniles concentrate in brackish water from RM 12 to 46. This seasonal change in distribution may be associated with seasonal movements of the saltwedge and differential seasonal use of habitats (Morris 2022). Juveniles tend to disperse upstream beginning in late spring (Bain

et al. 1998). Subadults also migrate and forage year-round in the East River (NOAA Fisheries 2020). A majority of the subadults (142 of 148) genetically sampled in the tidal Hudson River estuary were found to have originated from the Hudson River (Wirgin et al. 2018). The remaining individuals originated from the Kennebec River (two individuals; Gulf of Maine DPS), Delaware River (two individuals; New York Bight DPS), Ogeechee River (one individual South Atlantic DPS), and James River (two individual; Chesapeake Bay DPS). Haverstraw Bay and Newburgh Bay are documented areas of juvenile Atlantic sturgeon habitat (Sweka et al. 2007).

Shortnose Sturgeon

One other federally and state-listed endangered fish species that has the potential to occur in the survey area is the shortnose sturgeon. Adult and juvenile shortnose sturgeon migrate and forage in portions of the action area (NOAA GARFO 2019). Juvenile shortnose sturgeon may also overwinter in portions of the action area. In general, the use of marine waters by shortnose sturgeon is limited to the estuaries of their natal rivers. In the Hudson River, from late spring through early fall, adult sturgeon occur in deep channel freshwater and brackish habitats. Shortnose sturgeon have been recorded in a large portion of the Hudson River estuary, in a 1998 study most were documented between approximately RM 24 and 76 (Bain et al. 1998). When passive acoustic telemetry was used, shortnose sturgeon were detected north of RM 140 in Troy during the spring and stretched south to RM 15 in the summer (Pendleton et al. 2018). Shortnose sturgeon have not been recorded in the Harlem River or portions of the action area within the East River (Tomichek et al. 2014).

In winter, adults mainly concentrate in one area near Kingston, NY (approximately RM 90), north of the action area. Two additional smaller overwintering areas for adult shortnose sturgeon are also located from Saugerties to Hyde Park at approximately RM 76 to 105 and in the Croton-Haverstraw Bay area at RM 33 to 38 (Pendleton et al. 2018). Only the smaller overwintering aggregation in the Croton-Haverstraw Bay area overlaps with the action area where the survey vessels may transit, but no sampling would occur in the Croton-Haverstraw Bay area. Many juveniles overwinter in the lower river from the Battery to just north of Haverstraw Bay (RM 0 to 64; NOAA GARFO 2019). Shortnose sturgeon spawning has been documented to occur from late March to early May in the Hudson River north of Coxsackie, NY (approximately RM 125), which is well north of the action area (NOAA GARFO 2019). After spawning, the adults disperse downriver into their summer range (Bain et al. 1998; Pendleton et al. 2018). Gravel has been shown to be the strongest habitat predictor for shortnose sturgeon occurrence during the spring, with a weaker relative importance for mud substrate during the summer (Pendleton et al. 2018).

4.10.2.3 Marine Mammals and Sea Turtles

Sea turtles may be seasonally present in southern portions of the action area from May to mid-November with the highest concentrations present from June to October (NOAA GARFO 2019). This includes both portions of the survey area (e.g., Harlem and East Rivers) and nearby waters that survey vessels may transit to reach the survey area (e.g., Upper New York Bay). Juvenile and adult sea turtles generally migrate north into the Mid-Atlantic region in the spring as coastal water temperatures increase and migrate south in the fall as water temperatures cool. The occurrence of these migratory species within portions of the action area would be transient as nesting generally occurs in lower latitudes (NOAA Fisheries n.d.[a][b][c][d]). The action area has not been designated as Critical Habitat for any sea turtles, and there are no identified habitats of particular concern within the action area (NOAA GARFO 2019). Leatherback turtles are generally found in deeper offshore waters (USFWS 2018) and are therefore not likely to be located within the action area. The remaining sea turtle species referenced above might seasonally visit southern portions of the action area while foraging or migrating (NOAA GARFO 2019). However, it is unlikely that any sea turtles would be encountered during the proposed survey activities.

The NOAA Section 7 Mapper for the Greater Atlantic Region (NOAA GARFO 2019) as well as the NYSDEC ERM (NYSDEC n.d.[c]) for the action area do not identify any endangered or threatened marine mammals being present in the action area.

4.10.3 Important Habitats in the Project Area: Existing Conditions

4.10.3.1 Sturgeon Critical Habitat

Within the Hudson River, the proposed submarine transmission line corridor consists of a northern and a southern segment. The northern segment is roughly between RM 62 and RM 42, and the southern portion is roughly between RM 34 and RM 14. The surface sediment within the submarine corridor is a mixture of sand, mud (i.e., silt and clay), with pockets of gravel (Nitsche et al. 2006) (Figure 4-8 in see Attachment 1 to this Exhibit). See further discussion of marine physical characteristics in Section 4.8, above.

Five DPSs of Atlantic sturgeon were listed under the ESA in 2012 (77 FR 5880, 77 FR 5914) including the endangered New York Bight DPS. The final rule for Atlantic sturgeon critical habitat (all listed DPSs) was issued on August 17, 2017 (82 FR 39160). Critical habitat designations for the New York Bight DPS includes the Hudson River, within New York Bight Unit 3. Unit 3 of the Atlantic sturgeon New York Bight critical habitat begins where the main stem of the Hudson River discharges into the New York City Harbor at river mile (RM) 0 and stretches up to the Troy Lock and Dam at RM 154. New York Bight Unit 3 is broken into 3 parts: A, B, and C. The proposed submarine corridor extends into Part A of the New York Bight Unit 3 in the lower Hudson River.

Physical and biological features (PBFs) within these designated critical habitats have been identified as vital to conservation of the New York Bight DPS of Atlantic sturgeon, but may be ephemeral or vary spatially across time. These features include:

- PBF 1- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, and boulder) in low salinity waters (i.e., 0.0 to 0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- PBF 2- Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;
- PBF 3- Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, and gear) between the river mouth and spawning sites necessary to support:
    - Unimpeded movements of adults to and from spawning sites;
    - Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and
    - Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (e.g., at least 3.9 ft [1.2 m]) to ensure continuous flow in the main channel at all times when any sturgeon in any life stage would be in the river; and
- PBF 4- Water between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support:
    - Spawning;
    - Annual and interannual adult, subadult, larval, and juvenile survival; and

- Larval, juvenile, and subadult growth, development, and recruitment (e.g., 55°F [13°C] to 78.8°F [26°C] for spawning habitat and no more than 86°F [30°C] for juvenile rearing habitat, and 6 mg/L or greater dissolved oxygen for juvenile rearing habitat). 82 FR 39160.

The location of the freshwater/saltwater interface (salt front) is vital to understanding potential impacts on critical habitat for Atlantic sturgeon since fertilized eggs require low salinity waters in order to settle and grow (PBF 1) and juvenile foraging and growth (PBF 2). As discussed in Section 4.8.2.4, the salt front in the Hudson River ranges from approximately New Hamburg (RM 67.7) to Hastings-on-Hudson at RM 21.5 (de Vries and Weiss 2001). However, the salt front may extend as far south as the Bronx (near RM 15) during periods of heavy freshwater discharge and as far north as Poughkeepsie (RM 75) during periods of very low freshwater flow. Freshwater inputs tend to be highest during the spring and lowest during the summer months. The salinity of the river increases as distance from the salt front down river increases (PBF 2). Hard bottom substrate, essential for fertilized egg settlement (PBF 1) is limited in the Project Area. Six patches of gravel, less than 800 ft (244 m) wide and 3.1 mi (5.1 km) in length are mapped within the Project Area (NYSDEC 2005). South of the Federal Lock and Dam at Troy, the Hudson River is absent physical barriers to passage and generally has water column properties that support spawning, survival of all life stages, and growth of all life stages other than adults (PBFs 3 and 4).

4.10.3.2 Significant Coastal Fish and Wildlife Habitat: Existing Conditions

The proposed transmission line corridor crosses several Significant Coastal Fish and Wildlife Habitats (SCFWH) within and along the Hudson River as summarized in the following section (Figure 4-12 in Attachment 1 to this Exhibit). Under the authority of the Coastal Management Program and the Waterfront Revitalization and Coastal Resources Act, NYSDEC evaluates the statewide importance of coastal fish and wildlife resources, which upon review of the evaluation, becomes mapped and designated as SCFWH by the New York State Department of State (Executive Law of New York, Article 42).

Crossed by the Proposed Corridor

Hudson Highlands

The Hudson Highlands was designated as SCFWH in 1987. The Hudson Highlands is an extensive area of deep, turbulent river channel with strong currents and rocky substrates; unusual for the Hudson River estuary. This SCFWH is the Hudson's deepest and narrowest segment with strong currents and rocky substrates. Water salinity throughout is variable as the salt front migrates up and down the river through this area depending on tidal conditions and the amount of freshwater inflows up-river, which are dependent on seasonal weather patterns and extreme events. The combination of swift currents, rocky substrates, and freshwater inflow over this large area provides highly favorable conditions for reproduction by coastal migratory fishes, especially striped bass. Striped bass are known to spawn above river's salt front between West Point and Kingston from April to mid-June, with the semi-buoyant eggs found in greatest concentration from mid-May to early June and larvae transforming to juvenile between late June and early July. A portion of the SCFWH near Iona Island has been designated as part of a Hudson River National Estuarine Research Reserve (HNERR) site (Figure 4-12 in Attachment 1 to this Exhibit).

Haverstraw Bay

Haverstraw Bay was designated as SCFWH in 1987. The area is the most extensive area of shallow (less than 15 ft) estuarine habitat in the lower Hudson River which deepens to a navigation channel (dredged to about 35 ft). The area produces a predominantly brackish water habitat where the freshwater mixes with salt water from the Atlantic. The area is a major spawning, nursery, and wintering area for various estuarine fish species, most notable anchovy, Atlantic menhaden, and blue claw crab. Shortnose sturgeon regularly

occur in the area. The area also contributes to recreational and commercial fisheries. Significant numbers of waterfowl may occur in Haverstraw Bay during spring (March-April) and fall (September- November) migrations, but the extent of their use in this area is not well documented.

Lower Hudson Reach

The Lower Hudson Reach was designated as SCFWH in 1992. The Lower Hudson Reach is one of only a few large tidal river mouth systems in the northeastern United States' therefore it provides a unique range of salinity and other estuarine features. Salinity in this brackish environment ranges from 3.8 ppt to 18.7 ppt depending on the location of the salt front, which varies with the seasons. Concentrations of wintering striped bass and winter flounder are found in the area.

Within 1-mile Radius of the Proposed Corridor

Fishkill Creek

The Fishkill Creek was designated as SCFWH in 1987. The Fishkill Creek is a major freshwater tributary of the lower Hudson River containing a diversity of estuarine habitats. The habitat also includes a relatively large, wooded peninsula that extends into the Hudson River. Most of the Fishkill Creek habitat is within the tidal range of the Hudson River and contains extensive areas of mudflats, emergent marsh, and SAV beds. The diversity of natural ecological communities in the Fishkill Creek habitat provides favorable conditions for a variety of fish and wildlife species. Fishkill Creek is an important spawning area for coastal migratory fishes such as alewife, American eel, blueback herring, white perch, Atlantic tomcod, and striped bass.

Moodna Creek

The Moodna Creek was designated as SCFWH in 1987. The Moodna Creek is a major freshwater tributary of the lower Hudson River that is accessible to coastal migratory fishes; including the largest tidal marsh in Orange County. Moodna Creek is a relatively large, medium gradient, perennial, warmwater stream with a rocky substrate and a relatively undeveloped forested floodplain. The lower mile of the creek is within the tidal range of the Hudson River and is relatively deep with a silt and clay substrate. The marsh at the mouth of Moodna Creek is significant for rare plants and rare natural Communities including brackish intertidal mudflats and brackish tidal marsh. The considerable length of Moodna Creek that is accessible to coastal migratory fishes and the extensive wetland area at the mouth of the creek provide favorable habitat conditions for a variety of fish and wildlife species. Moodna Creel is an important spawning area for migratory fishes such as alewife, blueback herring, bay anchovy, American eel, Atlantic tomcod, and striped bass.

Constitution Marsh

The Constitution Marsh was designated as SCFWH in 1987. The Constitution Marsh is one of the largest undeveloped tidal wetlands on the Hudson River. The predominant ecological communities in the area include tidal marshes and flats, ranging in salinity from freshwater to brackish. Constitution Marsh receives freshwater inflows from several small, high gradient, coldwater streams, including Foundry Brook, Indian Brook, and Philipse Brook. The lack of development within the Marsh provides favorable habitat for vegetation and fish and wildlife species. The extensive shallow water areas and stream mouths provide spawning and nursery habitat for a variety of coastal migratory and resident freshwater fishes. Species found in the area include alewife, blueback herring, white perch, American eel, banded killifish, mummichog, fourspined stickleback, and largemouth bass.

Iona Island Marsh

The Iona Island Marsh was designated as SCFWH in 1987The Iona Island Marsh is a large, undeveloped tidal freshwater-brackish marsh in the Hudson River. Iona Island Marsh includes a sizeable tidal freshwater marsh within the Hudson estuary. The site has been designated one of four component sites of the HNERR (Figure 4-12 in Attachment 1 to this Exhibit) and is registered as a National Natural Landmark with the U.S. Department of Interior. The habitat is a highly productive wetland, with minimal human disturbance, providing favorable habitats for a variety of fish and wildlife species. Shallow bay areas and creek channels in Iona Island Marsh provide spawning and nursery habitats for a variety of coastal migratory species and resident freshwater fishes. Species found in the area include American eel, alewife, blueback herring, white perch, striped bass, banded killifish, and mummichog.

Croton River and Bay

The Croton River and Bay was designated as SCFWH in 1987. The Croton River and Bay is a major tributary and sheltered bay of the lower Hudson River, and the largest SAV in Haverstraw Bay occurs at the mouth of the Croton River. Freshwater tidal wetlands are also found along the bay. The Croton River and Bay have been subject to considerable habitat disturbance, including filling of wetlands for development, waste disposal, discharges of stormwater runoff, and the presence of road and railroad crossings, and invasive species. Despite significant habitat alterations affecting the area, tidal portions of Croton River and Bay remain important as fish and wildlife habitats in the lower Hudson Valley. Croton River and Bay comprise a large shallow bay area in the lower river that is sheltered from strong river currents and, to some extent, from prevailing winds. Consequently, the area provides favorable habitat conditions for a variety of coastal migratory and resident warmwater fish species.

Manitou Marsh

The Manitou Marsh was designated as SCFWH in 2012. The Manitou Marsh is an approximately 75-acre enclosed freshwater to low salinity tidal marsh located on the eastern shore of the Hudson River. Manitou Marsh is part of Manitou Point Preserve, which is owned by Scenic Hudson and managed by the Scenic Hudson Land Trust. Disturbances to this habitat include activities related to small residential communities, activities along the railroad causeway, and expansion of invasive species. Manitou Marsh provides important nursery habitat for resident freshwater, migratory and estuarine/marine species. Resident freshwater fish include carp, black-nose dace, yellow perch, redbreast sunfish, golden shiner, inland silverside, pumpkinseed, brown bullhead, bluegill, Eastern silvery minnow, and largemouth bass. Migratory fish species include alewife, striped bass, American eel, and blueback herring.

Piermont Marsh

The Piermont Marsh was designated as SCFWH in 1987. The Piermont Marsh is the only large, undeveloped, predominantly brackish marsh on the Hudson River. A portion of Piermont Marsh SCFWH is one of four component sites of the HNERR dedicated to environmental research and education. Sparkill Creek and Crumkill Creek within the Piermont Marsh provide limited spawning and nursery habitats for a variety of coastal migratory and resident freshwater fishes. Species found in the area include American eel, alewife, blueback herring, white perch, striped bass, banded killifish, and mummichog.

North and South Brother Islands

The North and South Brother Islands were designated as SCFWH in 1992. The North and South Brother Islands are relatively undisturbed wooded islands in the Manhattan Hills ecological region, located within the East River approximately 1 to 2 miles northeast of Randall's Island and Lawrence Point. South Brother

Island is approximately 10 acres in size, uninhabited, rocky and wooded. The North Brother Island is 15 acres in size, with a mix of abandoned buildings and deciduous woods. The North and South Brother Islands provide an undisturbed upland environment for wildlife that is rare in coastal portions of the New York City metropolitan area. The primary significance of this habitat is its use for nesting by relatively large numbers of colonial waterbirds. This nesting area probably accounts for many of the egrets and night herons seen in lower Bronx, Queens, and New York Counties. Common bird species found on these Islands include cattle egrets, snowy egrets, black-crowned night herons, great egrets, double-crested cormorants, herring gulls, and great blacked gulls.

4.10.3.3 Important Bird Areas

Important Bird Areas (IBAs) are designated as part of an international effort to identify, monitor, and protect habitats critical to the survival of bird populations. These areas are identified using internationally agreed-to criteria related to bird species that are globally threatened, occupy severely restricted ranges, are restricted to certain biomes, or species that congregate in certain habitats during part of their annual life cycle. In the United States, IBAs are approved and designated by the National Audubon Society in conjunction with guidance from BirdLife International. More than 130 IBAs have been designated in New York State (Audubon New York n.d.[a]). Figure 4-13 (see Attachment 1 to this Exhibit) shows IBAs within 1 mile of the proposed corridor.

Crossed by the Proposed Corridor

In 1997, Audubon New York identified the Catskill Peaks IBA in the Catskill Peaks region because it supports a significant proportion of the State's Bicknell's thrush population, in addition to providing habitat for other members of the sub-alpine bird community. The terrestrial transmission line corridor crosses this IBA for 11 miles in Delaware County from milepost 19.3 to 29.9. Most of the IBA is managed by New York State, but some parcels are privately owned. Areas of this IBA over 3,000 ft (914 m) support a sub-alpine bird community, including breeding yellow-bellied flycatcher, Swainson's thrush, hermit thrush, magnolia warbler, yellow-rumped warbler, white-throated sparrow, and dark-eyed junco. Areas above 3,500 ft (1,067 m) support the southern-most known breeding sites for Bicknell's thrush and blackpoll warbler. Other at-risk species found at the site include American black duck (breeds), osprey (breeds), bald eagle (observed in breeding season), sharp-shinned hawk (breeds), Cooper's hawk (breeds), northern goshawk (breeds), red-shouldered hawk (breeds), peregrine falcon (breeds), American woodcock (breeds), olive-sided flycatcher (breeds), wood thrush (breeds), cerulean warbler (breeds), and Canada warbler (breeds).

The Lower Hudson River IBA extends from just north of the Newburgh-Beacon Bridge south to Croton Point Park. The transmission line corridor crosses this IBA for approximately 24.3 miles, 22.0 miles of which are within the Hudson River and 2.2 miles of which are on Croton Point in Westchester County. The area is one of the most important wintering areas for bald eagles in the State and is also used as a nesting area for several pairs of bald eagles. Protection of important winter roost sites is a key conservation issue for the IBA (Audubon n.d. [b]). Other birds of concern known to use the area specifically around Croton Point include northern harrier (year-round), short-eared owl (wintering), grasshopper sparrow (breeding), vesper sparrow (migration stopover site), and Henslow's sparrow (stopover habitat).

Within 1-mile Radius of the Proposed Corridor

The Fahnestock and Hudson Highlands State Park IBA (New York Audubon n.d.[b]) was established in 2008, and includes the Hudson Highlands State Park adjacent to the Hudson River in Putnam County. The submarine corridor is within 1 mile of this IBA for approximately 4 miles and is 1,120 ft (341 m) away from the IBA at its closest point. The deciduous and mixed forests of the area support a broad bird

community including several species of concern: sharp-shinned hawk and Cooper's hawks (both confirmed breeders), northern goshawks (foragers, probable breeders), and whip-poor-will (breeding). Granite cliffs in the area provide nesting sites for peregrine falcon.

The Constitution Marsh IBA is part of the Hudson Highlands State Park and managed by Audubon New York as a wildlife conservation area; it was designated as an IBA in the early 2000s. An Audubon Center is on-site, providing education programs to the public. Constitution Marsh consists of a 4,000 to 5,000 year old fresh and brackish (depending on the time of year) tidal marsh (270 acres) and forested uplands (80 acres) located on the east shore of the Hudson River, directly opposite West Point Military Academy, and 52 miles north of New York City. The submarine transmission line corridor is within 1 mile of this IBA for approximately two miles and is 320 ft (98 m) from the IBA at it closest point. More than 200 species of birds have been recorded there, including nesting least bitterns, Virginia rails, and marsh wrens. Large numbers of waterfowl use the area during winter and migration, with average fall concentrations of up to 2,000 individuals reported. Mixed flocks of blackbirds (bobolinks, red-winged blackbirds, and common grackles) numbering in the thousands, use the site as a staging area and migratory stopover in the fall. Other at-risk species using the site include pied-billed grebes, American Bitterns, ospreys, bald eagles, northern harriers, sharp-shinned hawks, Cooper's hawks, merlins, peregrine falcons, willow flycatchers, wood thrushes, blue-winged warblers, cerulean warblers, worm-eating warblers, and Canada warblers.

Doodletown and Iona Island were designated as an IBA in 1997. It is situated along the western shore of the Hudson River just south of West Point, and includes portions of Bear Mountain State Park. The submarine transmission line corridor is within 1 mile of this IBA for approximately two miles and is 875 ft (267 m) from the IBA at it closest point. Deciduous forest, riverine habitats, and freshwater/brackish tidal wetlands dominate the site and influence bird use. More than 165 bird species have been documented at the site, including an unusual abundance and diversity of breeding warblers and other songbirds. At-risk species supported at this site include the pied-billed grebe, osprey, bald eagle, northern harrier, and golden-winged warbler. Other species documented here include the Acadian flycatcher, Louisiana waterthrush, Kentucky warbler, and hooded warbler.

Designated as an IBA in 1997, Hook Mountain includes almost seven continuous miles of riverfront and cliff slopes in Upper Nyack. The submarine transmission line corridor is within 1 mile of this IBA for approximately 5 miles and is 3,955 ft (1,205 m) from the IBA at it closest point. This IBA is the site of a fall hawk watch that has operated annually at the precipice of a ridge since 1971. An average of more than 12,000 hawks (maximum 25,929) are counted here each fall. This includes averages of 269 ospreys (maximum 435), 11 bald eagles (maximum 48), 183 northern harriers (maximum 362), 3,380 sharp-shinned hawks (maximum 7,070), 85 Cooper's hawks (maximum 166), 20 northern goshawks (maximum 112), 97 red-shouldered hawks (maximum 184), 3 golden eagles (maximum seven), and 13 peregrine falcons (maximum 54). Other hawk species include averages of 7,603 broad-winged hawks (maximum 18,733), 232 red-tailed hawks (maximum 462), 540 American kestrels (maximum 930), and 29 merlins (maximum 59).

North Brother and South Brother Islands, two small islands in the East River, were declared an IBA in the early 2000s. The submarine transmission line corridor is within 1 mile of this IBA for approximately 0.3 miles and is 3,200 ft (975 m) away from the IBA at it closest point. The site is important for nesting wading birds. Species nesting on the islands include great egrets (estimated 60 nests), snowy egrets (estimated 65 nests), cattle egrets (two nests), black-crowned night-herons (365 nests), and glossy ibis (four nests). Other nesting birds are double-crested cormorant (350 nests), herring gulls (140 nests), and great black-backed gull (90 nests). In addition, these islands are used for roosting and foraging sites for various waterbird species year-round.

4.10.3.4 Natural Communities Existing Conditions

Natural communities include locations of rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. NYNHP designates natural communities as significant when the community type is rare in New York State or, for more common community types, where the community at that location is a high-quality example and meets specific, documented criteria for state significance in terms of size, undisturbed and intact condition, and the quality of the surrounding landscape (NYSDEC 2022x). Natural communities identified by NYNHP near the proposed transmission line corridor (NYNHP 2021) are discussed in the following section.

Perched Bog

A perched bog is a flat peatland that occurs in shallow depressions in rock outcrops where there is a perched water table (Edinger 2014). This habitat is a good quality mature bog with no invasive species as it is well buffered from development. Typically, this occurs within a rocky barrens community. Vegetation is dominated by peat mosses and ericaceous shrubs, and the substrate is a shallow peat overlying bedrock.

A perched bog was identified by NYNHP within the Wolf Brook State Multiple Use Area approximately 0.3 miles southwest of the proposed corridor. Desktop analysis indicates that the identified perched bog is approximately 400 ft (122 m) southwest of the proposed corridor. In addition, a much smaller and open portion of the bog occurs just to the southeast of the main perched bog and is about 360 ft (110 m) southwest of the proposed corridor. A field-delineated PSS wetland is crossed by the corridor in this area and is hydrologically connected to the perched bog.

Hemlock-Hardwood Swamp

Hemlock-hardwood swamps are mixed swamps occurring on mineral soils and deep muck in depressions that receive groundwater discharge (Edinger 2014). This is a common and widespread swamp community in New York. Water levels typically fluctuate seasonally, typically being flooded in the spring and relatively dry by late summer.

A hemlock-hardwood swamp was identified by NYNHP in the Neversink River Unique Area approximately 0.5 miles west of the proposed corridor. The swamp is a smaller than average hemlock-hardwood swamp but was noted by NYNHP as being located within a good quality and large, forested landscape. Based on the Applicant's field delineation and desktop analysis, no portion of this community is present within or adjacent to the proposed transmission line corridor.

Floodplain Forest

Floodplain forests are typically hardwood forests occurring on mineral soils on low terraces of river floodplains and river deltas. This is a broadly defined community that can be variable and may be very diverse (Edinger 2014).

NYNHP identified a floodplain forest community along the Basher Kill where this stream is crossed by the proposed corridor. According to NYNHP, this forest community that occurs in patches but with a continued nuisance of Japanese knotweed. The proposed corridor is contained within the existing NYPA ROW where it crosses the Basher Kill and vegetation is managed by NYPA in this area in accordance with its IVM plan to prevent the growth of trees. Consequently, the floodplain forest community is not present within the proposed corridor.

Chestnut Oak Forest

Chestnut oak forests are hardwood forests occurring on well-drained sites within glaciated portions of the Appalachians. A chestnut oak forest was identified by NYNHP from where the proposed corridor crosses the Basher Kill and extending east-southeast for 2.9 miles to Mountain Road. NYNHP classified this as a very large chestnut oak forest in good to excellent condition. Evidence of this community was observed adjacent to the transmission line corridor during the Applicant's field delineations.

Hemlock-Northern Hardwood Forest

This community is a mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist well-drained sites at the margins of swamps. Canopy cover can be dense, resulting in low light on the forest floor and a relatively sparse ground layer (Edinger 2014).

A hemlock-northern hardwood forest was identified by NYNHP from where the proposed corridor crosses the Basher Kill and extending east-southeast for 2.9 miles to Mountain Road. NYNHP classified this as a patchy forest of varying condition. Evidence of this community was observed adjacent to the transmission line corridor during the Applicant's field delineations.

Red Maple-Hardwood Swamp

This community is a hardwood swamp occurring in poorly drained depressions or basins. They usually occur on inorganic soil but can also form on muck or shallow peat. The hydrology varies from permanently saturated to the surface to seasonally flooded/ wet with hummocks and hollows (Edinger 2014).

NYNHP identified a mature and very large red maple-hardwood swamp with very high species diversity located near Orange Lake and extending to within 0.1 miles of the proposed transmission line corridor. The proposed corridor in the vicinity of this community occurrence is located within the I-84 median and based on field delineations this community type is not present.

Brackish Intertidal Mudflats

Brackish intertidal mudflats are a sparsely vegetated community characterized by low-growing rosette-leaved aquatics. The community occurs on exposed intertidal mudflats where water salinity ranges from 0.5 to 18.0 ppt. The community is best developed where the habitat is nearly level so that large expanses are exposed at low tide (Edinger 2014).

NYNHP identified brackish intertidal mudflats at the following locations: Moodna Creek at the mouth of the Hudson River (approximately 0.8 miles from the proposed corridor), Con Hook (approximately 0.2 miles from the proposed corridor), Constitution Marsh (approximately 0.3 miles from the proposed corridor), Iona Island Marsh (approximately 0.5 miles from the proposed corridor), and Piermont Marsh (approximately 1 miles from the proposed corridor).

Brackish Tidal Marsh

Brackish tidal marshes occur where water salinity ranges from 0.5 to 18.0 ppt and water is less than 6 ft (1.8 m) deep at high tide. The community includes a diverse mixture of saltmarsh and freshwater tidal marsh species with no species attaining dominance over extensive areas (Edinger 2014).

NYNHP identified brackish tidal mudflats at the following locations: Moodna Creek at the mouth of the Hudson River (approximately 0.8 miles from the proposed corridor), Con Hook (approximately 0.2 miles

from the proposed corridor), Constitution Marsh (approximately 0.3 miles from the proposed corridor), Iona Island Marsh (approximately 0.5 miles from the proposed corridor), and Piermont Marsh (approximately 1 miles from the proposed corridor).

Cliff Community

A cliff community occurs on vertical exposures of resistant, non-calcareous bedrock (such as quartzite, sandstone, or schist) or consolidated material. These cliffs often include ledges and small areas of talus. There is minimal soil development, and vegetation is usually sparse (Edinger 2014).

NYNHP identified a cliff community approximately 240 ft (73 m) northeast of the proposed corridor at Magazine Point on Constitution Island.

Pitch Pine-Oak-Heath Rocky Summit

This is a community that occurs on warm, dry, rocky ridgetops and summits where the bedrock is non-calcareous (such as quartzite, sandstone, or schist), and the soils are relatively acidic. The vegetation may be sparse or patchy, with numerous rock outcrops. This community is broadly defined and includes examples that may lack pines and are dominated by scrub oak and/or heath shrubs apparently related to fire regime (Edinger 2014).

NYNHP identified a pitch pine-oak-heath rocky summit community on Constitution Island, approximately 240 ft (73 m) from the proposed corridor.

Brackish Subtidal Aquatic Bed

This community is an aquatic community of continuously flooded substrates with rooted aquatic vegetation. The water is brackish (salinity between 0.5 and 18.0 ppt) and the water is usually less than 6 ft (1.8 m) deep at low tide. As salinity increases downstream, this community may grade into marine eelgrass meadows (Edinger 2014).

NYNHP identified a brackish subtidal aquatic bed community at Piermont Marsh approximately 1 mile northwest of the proposed corridor on the west side of the Hudson River.

Rocky Summit Grassland

This community is a grassland community that occurs on rocky summits and exposed rocky slopes of hills. Woody plants are sparse and may be scattered near the margin of the community (Edinger 2014). NYNHP identified a rocky summit grassland community approximately 550 ft (168 m) northeast of the proposed corridor on the Hudson River shoreline below Camp Smith.

4.10.4 Protected Species and Important Habitats Impacts and Mitigation

4.10.4.1 Submarine Corridor Species: Potential Impacts and Proposed Mitigation

As mentioned in Section 4.9.5, installation of the Project would result in temporary increases in suspended sediment. This sediment disturbance will cause a temporary elevation in TSS and potentially associated contaminants. Project-specific modeling has been conducted to estimate potential Project-related TSS concentrations down current of the Project's in-water construction activities. Based on existing sediment data and preliminary assumptions regarding cable installation methods and burial depths, the Applicant estimates that TSS concentrations may exceed 50 mg/L at a distance of 500 ft from the route in some

locations, but not others. TSS remains above 50 mg/L for only a few hours in most areas. TSS concentrations remain above 50 mg/L for 10-12 hours in a few small areas in the Hudson River and less than 24 hours in the Harlem River on the east bank and less than a few hours on the west bank. Research directly targeting Atlantic sturgeon tolerance of elevated TSS levels is lacking, however the frequent occurrence of the species in highly turbid environments, such as rivers and estuaries, suggests they tolerate elevated TSS. One study advised that in order to avoid physiological and behavior effects, adult Atlantic sturgeon should not be exposed to TSS levels of 1,000 mg/l above ambient levels for longer than 14 days (Johnson 2018). Wilkens et al. (2015) exposed juvenile Atlantic sturgeon to 100, 250, and 500 mg/l TSS levels for 3 days in a lab setting. With a 96% survival rate, they concluded that the absence of any significant effects on survival or swimming performance indicates that the impacts of sediment plumes in natural settings are minimal where fish are able to move or escape. Therefore, turbidity effects from the Project are not anticipated to have physiological or behavioral impacts on adult or juvenile Atlantic or shortnose sturgeon. Many sea turtle species routinely forage in nearshore and estuarine environments and experience temporary levels of elevated turbidity. Though foraging sea turtles are not common in the Project area, it is expected that those impacted would move to another area and avoid impacts. The remaining impacts discussed in Section 4.8.4 are not anticipated to result in measurable impacts to Atlantic sturgeon, shortnose sturgeon, or sea turtles.

As discussed in Section 4.9.5, sessile and infaunal benthic organisms within the direct area of benthic disturbance will be impacted but sediment would be expected to quickly fill in depressions following mechanical backfill, if warranted, to restore natural gradients and predominant grain size. Impacts on benthic communities would be temporary. The benthic communities are expected to begin recolonizing the affected areas quickly (i.e., days to weeks) following disturbance, and are expected to recover naturally within 1 to 5 years following disturbance. Adult Atlantic sturgeon primarily use the Hudson River estuary for spawning and migration between spawning grounds and foraging grounds. However, juvenile Atlantic sturgeon use the Hudson River estuary for both migrating and foraging year-round (GARFO 2019). Juveniles use soft substrates and prey up benthic organisms such as worms, crustaceans, and molluscs (Dadswell 2006). Shortnose sturgeon forage on crustaceans, insects, and small molluscs, with adults preferring molluscs and juveniles selecting more insects and crustaceans (Carlson and Simpson 1987). As noted above, the sessile and infaunal prey within the Applicant's submarine transmission corridor are assumed to perish and not be available as prey to juvenile Atlantic and shortnose sturgeon, as well as adult shortnose sturgeon. However, the benthic infaunal and sessile communities would return within days to weeks and sturgeon are known opportunists. It is likely that juvenile sturgeon within the area of disturbance would either leave the area to locations where infaunal or sessile prey are still available, or switch to mobile prey (e.g., crustaceans) that are able to avoid mortality from disturbance. Since sea turtle density in the Project area is expected to be low and benthic disturbance impacts to prey items temporary, the impact of benthic disturbance from the Project on sea turtles is expected to be negligible.

Though cable burial is the preferred protection technique, the Project would potentially convert localized areas of soft bottom habitat to hard bottom in areas where cable and pipeline crossings, as well as areas where sufficient burial depth cannot be achieved. Cable protection could be one of or a combination of rock, rock bags, concrete mattresses, or geotextile mattress. The amount placed around each submarine cable will be based on a variety of factors, including water flow and substrate type (hydrodynamic scour modeling), and potential other uses (e.g., commercial fishing or other maritime activities). Increases in hard bottom substrate is a potential net positive to adult Atlantic sturgeon since primary use of the Hudson River estuary is spawning and Atlantic sturgeon eggs require hard substrate to attach, however spawning has not been documented south of RM 70. Similar to the discussion above, conversion of soft to hard bottom could decrease the foraging area a negligible amount for juvenile Atlantic and shortnose sturgeon, as well as adult shortnose sturgeon. However, unlike the turbidity discussion, these impacts would be permanent. As an impact minimization measure, armoring is not the preferred method of cable protection and will only be employed when the preferred option of burial is not possible. Since sea turtle density in the Project area is

expected to be low and there is a lack of documentation of sea turtles foraging in the Project area, the impact of conversion of soft to hard bottom from the Project on sea turtles is expected to be negligible.

Also mentioned in Section 4.9.8, in-water noise would be generated during construction activities, mainly from jetting, plowing, trenching or localized dredging for cable installation. Johansson and Andersson (2012) recorded underwater noise levels generated during a comparable operation involving pipelaying and a fleet of nine vessels. Mean noise levels of 130.5 dB re 1 µPa were measured at 1,500 m from the source. Reported noise levels generated during a jet trenching operation provided a source level estimate of 178 dB re 1 µPa-m measured at 1 m from the source (Nedwell et al. 2003). Reported sound levels of clamshell dredges include 176 dB re 1 µPa-m (BC MoTI 2016) and 107 to 124 dB re 1 µPa at 154 m (~500 ft) from the source with peak frequencies of 162.8 Hz (Dickerson et al. 2001; McQueen et al. 2019). Maximum levels occurred when the dredge bucket made contact with the channel bottom in mixed coarse sand or gravel (McQueen et al. 2019; Dickerson et al. 2001). The in-water noise is not expected to exceed the NOAA Fisheries noise-injury threshold for fish (183 dB re 1 µPa2-s SELcum for fish less than 2 grams and 187 dB re 1 µPa2-s SELcum for fish 2 grams or greater). Based on NOAA Fisheries guidance, behavioral effects are possible above 150 dB re 1µPa RMS; however, effects would be temporary with effects dissipating once the activity or individual has left the area. The in-water noise threshold for injury of sea turtles for non-impulsive sources is 200 dB re 1µPa RMS, while the threshold for behavioral disturbance is 175 dB re 1µPa RMS (U.S. Navy 2017). Based on the source levels presented in the literature for cable laying activities to those that will be used for the Project, behavioral disturbance thresholds could be exceeded. Observed behavioral changes in free-swimming fish include startle response, changes in schooling patterns, and shifts of distribution in the water column (Popper et al. 2014). However, hydraulic dredging did not significantly impact horizontal swimming behavior and did not pose a barrier to adult Atlantic sturgeon migrating to spawning grounds in the James River, Virginia (Balazik et al. 2020). Behavioral effects are considered possible but would be temporary with effects dissipating once the activity has ceased or individual has left the area. Also, the Applicant acknowledges NYSDEC and/or NOAA Fisheries recommended time-of-year work restrictions during the peak sturgeon migration period in the spring and summer, although as noted above other species and resource concerns may have conflicting time-of-year restrictions that will need to be resolved in the certificate conditions. The Applicant will coordinate with NYSDEC and/or NOAA Fisheries to develop a mitigation plan for potential unavoidable adverse impacts on sturgeon, as warranted; such a plan would likely include implementation of a net conservation benefit project. Regarding sea turtles, noise-related impact is not expected due to the unlikely presence of sea turtles in the Project area and their higher threshold for noise disturbance (compared to sturgeon).

Project-related vessels, including those used in construction and operation, pose a potential collision risk to protected species. Vessel strikes caused by vessel traffic are a common cause of injury and mortality among sturgeon and sea turtles (Brown and Murphy 2010; Foley et al. 2019; Ataman et al. 2021). Propeller boats and barges can pose a risk to fish that swim near the water surface and are a potential source of mortality for Atlantic sturgeon as a result of direct collisions with the hull or propeller (Brown and Murphy 2010). However, there is little research that analyzes the type of vessels likely to cause sturgeon vessel strikes. Balazik et al. (2012) used the movement of three male Atlantic sturgeon in the James River, Virginia and considered the approximate draft of three vessel categories to extrapolate the type of vessel with the greatest potential to cause vessel strike related mortality. Through this research, it was concluded that the majority of vessel-related Atlantic sturgeon mortality in river channels is thought to be caused by large transoceanic vessels (Balazik et al. 2012), which are much larger and have much deeper drafts than the vessels anticipated for use by the Project. Large vessels have been implicated because of their deep draft (up to 40 to 45 ft [12.2 to 13.7 m]) relative to smaller vessels (15 ft [<4.5 m]), which increases the probability of vessel collision with demersal fishes like Atlantic sturgeon, even in deep water (Brown and Murphy 2010). However, due to the existing amount of vessel traffic (i.e., approximately 63 larger vessel transits per week [AIS 2017]), vessel transits in the Hudson River estuary resulting from the Project are not expected to have

a significant or measurable effects on Atlantic or shortnose sturgeon. Vessel interactions are a significant source of sea turtle injury and mortality and injury, via trauma and propeller wounds. However, due to rarity of sea turtles in the Project area, effects of vessel traffic on sea turtles are not expected to have a measurable effect.

The cable for the Project would be an extruded cross-linked polyethylene (XLPE) cable, which has significantly reduced maintenance requirements compared to a traditional, fluid-filled, paper-insulated cable. The containerized jointing method described previously ensures cable joints are performed as per manufacturer guidance, to ensure reliable operation of the Project. The submarine cable will be monitored remotely, and no regular physical maintenance is anticipated to be necessary other than occasional non-invasive surveys of the cable from a vessel, similar to the pre-construction geophysical surveys. Therefore, no further impacts to sturgeon are anticipated due to Project-related maintenance.

In the event of a fault or damage to the terrestrial portion of the transmission line, most replacement work can be completed from the nearest joint bays or vaults, not requiring extensive excavation along the cable route. During rare occasions when the submarine cable may require repair, or burial depth needs to be maintained due to natural erosion events, these unanticipated impacts would be temporary and limited to the immediate area around the cable damage or erosion area. While these maintenance-related impacts on Atlantic sturgeon and shortnose sturgeon would be similar to the type of temporary impacts that would occur during the construction phase, the maintenance-related impacts would likely be shorter in duration and much smaller in area relative to the construction phase. If excavation is required for repairs during operations, impacts would be further minimized through BMPs (i.e., similar to those used for the construction phase) on vessels activities, sediment suspension, and deposition yielding only localized, temporary impacts to Atlantic and shortnose sturgeon.

The two field types emitted by transmission cables are electric and magnetic, and collectively referred to as the EMF. The natural geomagnetic field in the United States averages approximately 50 µT and a baseline environmental electrical field ranging from 0.005 to 0.05 mV/m is generated when seawater moves through the Earth's magnetic fields (Kalmijn 1971). Atlantic sturgeon appear to have relatively low sensitivity to magnetic fields. Bevelhimer et al. (2013) studied behavioral responses of lake sturgeon, a species closely related to Atlantic sturgeon, to artificial EMFs and concluded a detection threshold between 10,000 and 20,000 milligauss (mG) (1,000 to 2,000 µT). In comparison, the Applicant's Magnetic Field Simulation Report indicates that the proposed submarine transmission line will generate a maximum magnetic field strength of approximately 3,450 mG at the surface of the riverbed, and approximately 500 mG at a distance of 3.3 ft (1 m) above the riverbed (see Appendix L: Magnetic Field Simulation Report to this Exhibit).[1] Klimley et al. (2017) detected no effect on migrating adult green sturgeon, *Acipenser medirostris*, from the 200 kV HVDC Trans Bay Cable over a seven-year study. Furthermore, it was discovered that the magnetic anomalies created by bridges spanning the San Francisco Estuary were an order of magnitude larger than those created by the HVDC cable (Klimley et al. 2017). Therefore, Atlantic sturgeon are unlikely to sense or be impacted by the magnetic fields generated by the Project. Atlantic sturgeon have electroreceptors on their snout and gill covers capable of detecting electrical fields on the order of 0.5 mV/m (Normandeau 2011; Gill et al. 2012). Information on the response of Atlantic sturgeon to detectable electrical fields is sparse. When captive juvenile Atlantic sturgeon were exposed to pieces of electropositive metal pieces producing weak electrical fields, they exhibited avoidance behavior when food was present but did not exhibit behavioral changes when food was absent (Bouyoucos et al. 2014). Migrating Danube sturgeon (*Acipenser gueldenstaedtii*) were observed slowing down when crossing

[1] The magnetic field model assumes 2 ft (0.6 m) of cover over the pipeline at the riverbed, e.g., using concrete mattresses at a cable or pipeline crossing. Burial depths are expected to be much greater along most of the submarine transmission line route.

beneath overhead high voltage AC cables and speeding up once past them (Gill et al. 2012), however these conditions are significantly different from those of the Project. For example, overhead power cables are unshielded and generate relatively powerful induced electrical fields compared to shielded subsea cables. Nonetheless, Hutchison et al. (2018) reported the generation of AC fields by two submarine HVDC cables in New York – the Neptune Regional Transmission System cable and the Cross Sound Cable. The electric fields measured above these buried cables ranged between approximately 0.2 and 1.0 mV/m. Therefore, EMF from the proposed submarine transmission line during operation may be detectable by Atlantic sturgeon, but are not expected to adversely impact the species.

Cumulative impacts of the proposed submarine transmission line installation, operation, and long-term maintenance on Atlantic and shortnose sturgeon would include both spatial and temporal impacts over the life of the project. However, the cumulative effect of these impacts would be limited by the differences in both the timing and type of impacts during the construction versus the operation phases of the Project. Initial construction impacts from cable lay and trenching activities such as noise, sediment disturbance, and increased vessel traffic in 47 miles of the lower Hudson River are expected to occur over a relatively short span of approximately 6 sequential months.

As a result of construction, it is anticipated that less than 3 acres of long-term impact from habitat conversion would also occur due to construction at locations where armoring material is placed. This area of conversion would be a small fraction of the 78,322 acres of estuary along the entire 153-mile length of the Lower Hudson River (NYSDEC n.d.).[2] The only other ongoing and regular operational impact would be the presence of induced magnetic fields when the Project is operating and would not begin until after installation is completed. Modeling of the induced magnetic field for a scenario using the least cable cover (2-ft of concrete mattresses) yielded values well below the detectable threshold of adult individuals of a representative sturgeon species. The submarine cable will be monitored remotely, and no regular physical maintenance is anticipated to be necessary other than occasional non-invasive surveys of the cable from a vessel, similar to the pre-construction geophysical surveys. During rare occasions when the submarine cable may require repair, or burial depth needs to be maintained due to natural erosion events, these unanticipated impacts would be temporary and limited to the immediate area around the cable damage or erosion area. While these maintenance-related impacts would be similar to the type of temporary impacts that would occur during the construction phase, the maintenance-related impacts would likely be shorter in duration and much smaller in area relative to the construction phase. In the unlikely event of a cable failure requiring splicing, etc., the cable will be de-energized as soon as the fault occurs and will not be re-energized until after the repair is complete, such that there would not be any EMF impacts during the repair activity. Therefore, the cumulative impacts of the Project on Atlantic and shortnose sturgeon would not be significantly greater than the impacts independently identified for each individual phase of the Project.

4.10.4.2 Submarine Corridor Important Habitats: Potential Impacts and Proposed Mitigation

Factors of the Project with potential to impact Atlantic sturgeon critical habitat include vessel activity, physical disturbance of the riverbed during installation (including UXO removal), and long-term effects of cable operation while buried. Vessels transiting from the Project area to the docks/ports will not alter the substrate of the river (PBF 1 and 2), nor will they alter the depth of the river (PBF 3). Project vessels will not create a barrier to passage of Atlantic sturgeon in the rivers (PBF 3). Lastly, Project vessels will not alter the oceanographic conditions of salinity, temperature, and dissolved oxygen of the rivers, especially in the bottom meter of the water column, except for some potentially very localized increase in vertical

[2] NYSDEC (New York State Department of Environmental Conservation). n.d. Lands and Waters: Lower Hudson Watershed [Web Page]. Accessed online at: http://www.dec.ny.gov/lands/48367.html on February 23, 2023.

mixing (PBFs 1, 2, and 4). UXO removal will likely create temporary disturbances with turbidity and long-term alteration of the topography in the immediate area of detonation, but would not alter the salinity or other oceanographic, if required (PBFs 1, 2, and 4). Though turbidity would increase if UXO detonation were required, particle suspension would be temporary and not present a barrier to Atlantic sturgeon (PBF 3). Cable installation will be accomplished by jetting, plowing, trenching, or dredging, which can result in temporary resuspension of sediment and increased turbidity. Offshore environments have shown the water quality effects of cable installation using similar methods as the Project are short-term and localized (Latham et al. 2017). Due to the increased currents in a riverine environment, effects of cable installation are expected to be the same or even less than those in the offshore environment (PBF 3). Additionally, cable installation would not affect salinity or other water quality parameters (PBFs 1, 2, and 4).

Long-term impacts of cable operation on Atlantic sturgeon critical habitat within the immediate corridor of the Project include potential conversion of soft to hard bottom, heat, and EMF. In areas where burial of the cable is not feasible, or where sufficient burial depth is not achieved, remedial cable protection will be installed to protect the cables. The locations requiring protection, the type of protection selected, and the amount placed around each submarine cable will be based on a variety of factors, including water flow and substrate type (hydrodynamic scour modeling), and potential other uses (e.g., commercial fishing or other maritime activities). Cable protection measures may also be installed at cable and pipeline crossings. Where the submarine cable route requires the crossing of such assets, specific crossing designs will be developed and detailed in the EM&CP. The addition of hard bottom actually supports PBF 1, though spawning has not been documented south of RM 70, which is near Crown Heights, Poughkeepsie, NY (River Kilometer 113; Van Eenennaam et al. 1996; Bain et al. 1998; NOAA GARFO 2019). Cable protection would not alter salinity or water quality of the surrounding area, nor would it increase turbidity (PBFs 1, 2, 3, and 4). Though conversion of soft to hard bottom from cable protection would remove some areas for potential juvenile foraging (PBF 2), the area of potential cable protection is extremely small compared to the remaining area of the lower Hudson River, which is dominated by soft bottom habitat (NYSDEC 2005). Residual heat is lost to the surrounding environment when transmitting energy via a transmission cable. Heat emission for AC cables is greater than that emitted from DC cables (Taormina et al. 2018). Burial depth and type of surrounding sediment directly impact temperature measurements immediately surrounding the cable (Emeana et al. 2016). Temperature increase in the top layer of sediment will be negligible and temperatures at the sediment-water interface will be even further reduced due to the rapid heat dissipation from water and currents (PBF 4). EMF has not been shown to alter salinity or water quality of the surrounding area, nor would EMF increase turbidity (PBFs 1, 2, 3, and 4). EMF would also not impact the sediment composition (PBF 1).

4.10.4.3 Terrestrial Corridor Species: Potential Impacts and Proposed Mitigation

Federally and State-Listed Species

Indiana Bat

Occupied habitat for Indiana bats is all suitable habitat within 10 miles of known priority 1 or 2 hibernacula, 5 miles of known priority 3 or 4 hibernacula, 5 miles of positive acoustic survey results or mist-netting captures without identified roost tree data, and 2.5 miles of known roost trees. Potential habitat for Indiana bats is all suitable habitat that lies within USFWS' predictive model that is not already known to be occupied by Indiana bats. Based on occupied habitat data provided from USFWS and NYSDEC, and preliminary Project design, the Project would result in approximately 5.4 acres of permanent forest removal and 5.2 acres of additional forest removal in areas of occupied habitat for Indiana bats. Additionally, the Project would result in approximately 22.0 acres of permanent forest removal and 32.6 acres of additional forest removal that could provide potential habitat for Indiana bats based on the identified limits of the USFWS predictive model area.

Seasonal clearing restrictions alone do not guarantee avoidance of incidental take for Indiana bats. USFWS' New York Field Office and NYSDEC have determined that, to avoid Indiana bat take, 35% tree cover must be maintained within the 2.5-mile radius maternity colony home range. In such instances where the surrounding tree cover is under 35%, maintaining flight corridors between suitable habitat is also reviewed. As such, to avoid take of Indiana bat, the Applicant will conduct an analysis to confirm that each known maternity colony home range within 2.5 miles of the proposed transmission line corridor exceed 35% tree cover, and that additional clearing would not lower that cover below 35%. The Applicant intends to conduct clearing of forested habitat within known or potential habitat from November 1 to March 31 to the maximum extent practicable. If a need arises to clear any suitable habitat during the active season, April 1 through October 30, the Applicant will consult with USFWS and NYSDEC to determine the best path forward to protect the Indiana bat.

The Applicant is in the process of evaluating whether any additional tree clearing is required in areas identified as occupied Indiana bat habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. The Applicant will provide results of further agency consultation, including survey results, if completed, in the EM&CP.

NLEB

Occupied habitat for NLEB is all suitable habitat within 5 miles of known hibernacula, 3 miles of positive acoustic survey results or mist-netting captures without identified roost tree data, and 1.5 miles of known roost trees. Potential habitat for NLEB is all suitable habitat that lies within the USFWS's predictive model that is not already known to be occupied by NLEB. As discussed in Section 4.10.2.1, the Project contains both occupied habitat and potential habitat for NLEB. Based on occupied habitat data from USFWS and NYSDEC, and preliminary Project design, the Project would result in approximately 6.0 acres of permanent forest removal and <0.1 acres of additional forest removal within occupied habitat for NLEB. Additionally, the Project would result in approximately 21.4 acres of permanent forest removal and 37.8 acres of additional forest removal for temporary workspace that could provide potential habitat for NLEB based on the identified limits of the USFWS predictive model area. USFWS issued a 4(d) rule of the ESA for this species, which was published in the Federal Register on January 14, 2016. The 4(d) rule prohibits "incidental take" within white- nose impacted areas of the NLEB's range when a proposed action is (1) within a known hibernaculum; (2) includes tree removal within 0.25 miles of a known hibernaculum; or (3) cuts or destroys a known, occupied maternity roost tree or other trees within a 150-ft (46-m) radius from the maternity roost tree during the pup season from June 1 through July 31. Incidental take for other activities is covered under the Programmatic Biological Opinion associated with the 4(d) rule.

All known NLEB hibernacula are greater than 0.25 miles from the transmission line corridor, and all known maternity trees are greater than 150 ft (46 m) from the corridor. As such, under the current 4(d) rule, the Applicant does not propose any actions that would result in prohibited incidental take. Any incidental take associated with clearing trees within occupied habitat is covered under the Programmatic Biological Opinion associated with the 4(d) rule. The Applicant understands that the NLEB may become an endangered species as soon as November 2022 (USFWS 2022d) which would eliminate the 4(d) rule. As such, the Applicant will continue to consult with USFWS New York Field Office regarding any updated guidelines for avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Because New York State does not have the equivalent of a USFWS 4(d) rule, a permit is required for the "take" of a State-protected species under 6 NYCRR § 182.11. "Occupied" habitat for NLEB is defined by NYSDEC as those areas within 5 miles of a known hibernacula or 1.5 miles from a documented summer occurrence (NYSDEC 2022o). As stated above, approximately 6.0 acres of known and 59.2 acres of

potential NLEB habitat will be permanently cleared. The Applicant intends to avoid incidental take of NLEB by only clearing occupied habitat during the species' hibernation period between November 1 and March 31. Assuming this is practicable based on final occupied habitat areas, design and construction schedule, a New York State incidental take permit will not be required. The Applicant is in the process of evaluating whether any additional tree clearing, other than the permanent and temporary clearing presented above, is required in areas identified as occupied NLEB habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. If a need arises to clear any suitable habitat during the active season, April 1 through October 30, the Applicant will consult with USFWS and NYSDEC to determine the best path forward to protect the NLEB.

The Applicant is in the process of evaluating whether any additional tree clearing, other than the tree clearing presented above, is required in areas identified as occupied NLEB habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. Additionally, the Applicant will consult with USFWS and NYSDEC if the NLEB status is changed from threatened to endangered, in which case it is expected that such a change would nullify the existing 4(d) rule. The Applicant will provide results of further agency consultation, including survey results, if required, in the EM&CP.

Roseate Tern, Piping Plover, and Red Knot

As noted in Section 4.10.2.1, no nesting or essential foraging habitat is present for roseate tern, piping plover, or red knot at the Randall's Island and Lawrence Point landfalls. Any transient individuals in proximity to construction activities would be expected to temporarily relocate from the area with no risk for mortality or other harm. Consequently, the Project is not anticipated to directly impact roseate tern, piping plover, or red knot.

Bog Turtle

As discussed in Section 4.10.2.1, the Applicant completed Phase I bog turtle habitat surveys and identified two wetlands in the terrestrial transmission line corridor with suitable bog turtle habitat. The Applicant then completed Phase II presence/absence surveys in accordance with USFWS protocols (see Appendix J to this Exhibit) and determined that bog turtles are not present in either wetland. Because bog turtles were not found to be present within the transmission line corridor, the Project is not expected to affect this species.

Dwarf Wedgemussel

As discussed in Section 4.10.2.1, USFWS and NYSDEC identified the Neversink River and Basher Kill as crossings of concern for potential impacts to dwarf wedgemussel. The Applicant is evaluating the feasibility of using trenchless methods to cross both streams to avoid direct impacts and plans to complete dwarf wedgemussel survey at both crossings prior to construction. Additional details regarding survey plans and/or findings and avoidance/minimization measures related to this species will be included in the EM&CP.

Seabeach Amaranth

As discussed in Section 4.10.2.1, no suitable habitat is present for this species within the transmission line corridor or at the landfall sites. Consequently, seabeach amaranth will not be impacted by the Project.

Small-whorled Pogonia

As discussed in Section 4.10.2.1, USFWS notified the Applicant that small-whorled pogonia presence/absence surveys should be completed for any portions of the Project in Orange County where upland forest with open understory will be cleared. The Applicant has not identified any such habitat at this time, but additional evaluations will be completed as Project design advances; if any such habitat is identified within construction workspace, presence/absence surveys will be completed during the flowering period of mid-May to mid-June. Additional information regarding survey findings, if necessary, will be included in the EM&CP.

Additional State-listed Species

Bald Eagle

As discussed in Section 4.10.2.1, the terrestrial transmission line crosses two bald eagle winter concentration areas: one along the Neversink River and another on Croton Point. The Applicant plans to cross the Neversink River using HDD; the transmission line will be installed on Croton Point using a combination of trenching and HDD at the landfall site. If construction in these areas is completed during the winter, any bald eagles in the vicinity of active construction may or may not react depending on distance and noise levels. The Applicant will consult with USFWS and NYSDEC to determine the need for specific avoidance and minimization measures for construction within these bald eagle winter concentration areas, or if any additional surveys are needed.

As discussed in Section 4.10.2.1, the submarine transmission line corridor crosses three bald eagle winter concentration areas: the perimeter of Constitution Island, the stretch of the Hudson River from the Bear Mountain Bridge to Indian Point, and off the tip of Croton Point. As noted above, if construction in these areas is completed during the winter, any bald eagles in the vicinity of active construction may or may not react depending on distance and noise levels. The Applicant will consult with USFWS and NYSDEC to determine the need for avoidance and minimization measures for construction within these bald eagle winter concentration areas.

As discussed in Section 4.10.2.1, the terrestrial transmission line corridor is within 1 mile of two recently active bald eagle nests. The Conservation Plan for Bald Eagles in New York State states that construction of utilities is not recommended within 0.25-miles (1,320 ft) of an eagle nest, if there is no visual buffer. If a visual buffer exists and the activity/feature is not visible from the nest, such activities should not occur within 660 ft (201 m) of the nest site. The nest location near the Newburgh-Beacon Bridge Landfall is more than 0.25-miles from the corridor. The bald eagle nest on Croton Point is about 1,350 ft from the corridor, or just outside the recommended buffer, and a forested area provides a visual buffer from the nest. As such, no impacts to either nest site are expected from construction of the Project.

As discussed in Section 4.10.2.1, the submarine transmission line corridor is within 1 mile of six recently active bald eagle nests. Five of the six nests are more than 0.25 miles from the corridor. One nest near Manitou Marsh is within 660 ft (201 m) of the corridor with no visual buffer. The Applicant will consult with USFWS and NYSDEC once the final submarine route is determined and the exact limits of construction disturbance are established to determine appropriate avoidance and minimization measures related to this nest site.

Northern Harrier and Upland Sandpiper

As discussed in Section 4.10.1.1, there are no fields in excess of 25 acres of suitable habitat for northern harrier and upland sandpiper nesting, although habitat suitable for foraging may be present for these species

in the proposed corridor. Any transient or foraging individuals in proximity to construction activities would be expected to temporarily relocate from the area with no risk for mortality or other harm. In addition, the terrestrial transmission line will not permanently impact suitable habitat as it will be restored following construction.

The Croton Point Park landfill cap adjacent to the proposed corridor and nearby tidal marshes provide suitable habitat more than 25 acres. However, the NYNHP did not identify this area as supporting breeding populations of northern harrier or upland sandpiper. The proposed corridor in this area follows an existing road and will not impact the suitable grassland habitat present on the adjacent landfill cap or the tidal marshes. Consequently, the Project is not anticipated to directly impact northern harrier or upland sandpiper in this area. The Applicant will continue to consult with NYSDEC regarding avoidance and minimization measures for these species.

Peregrine Falcon

According to NYSDEC, peregrine falcons nest on every Hudson River bridge south of Albany (NYSDEC 2022a). Because nests located on bridges are typically located within the bridge structure high above the waterline, the Applicant does not anticipate construction-related impacts to the species related to activities at water level. The Applicant will continue to consult with NYSDEC regarding any avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Golden Eagle

As discussed in Section 4.10.2.1, golden eagles may occur proximate to the submarine corridor along the Hudson River bridges as well as in Delaware and Sullivan Counties, where they are most likely to occur during migration. There may also be some wintering and transient use. Because golden eagle nesting does not occur in New York State, any migrating, wintering, and/or transient birds near active construction will likely move on to another foraging or roosting area not directly proximate to active construction.

Pied-billed Grebe and Least Bittern

As discussed in Section 4.10.2.1, pied-billed grebe and least bittern may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. As such, there is potential for both breeding and foraging individuals of these species to be present in proximity to construction activities in the Hudson River. However, any individuals that are breeding or foraging along the outer periphery of the Hudson River marshes will be accustomed to marine traffic. As such, the Applicant does not expect these individuals will be disturbed during construction of the submarine transmission line. There will be no direct impacts to habitat because the Hudson River marshes are avoided, and surveys at the landfall locations did not identify any suitable breeding habitat adjacent to landfall locations.

Timber Rattlesnake

As discussed in Section 4.10.2.1, although suitable habitat for this species is present in some sections of the corridor in Sullivan County, NYSDEC advised the Applicant that timber rattlesnake surveys are not necessary because the Applicant offered to have monitors present during construction activities occurring within NYNHP timber rattlesnake buffer areas. These timber rattlesnake buffer areas consist of two, approximately 1-mile sections of the terrestrial corridor in Sullivan County. The Applicant will continue to consult with NYSDEC regarding avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Brook Floater

As discussed in Section 4.10.2.1, NYSDEC identified the East Branch of the Delaware River, Beaver Kill, and Neversink River as crossings of concern for potential impacts to brook floater. The Applicant is evaluating the feasibility of using trenchless methods to cross these streams to avoid direct impacts. The Applicant also plans to complete brook floater surveys at each crossing prior to construction. Additional details regarding survey plans and/or findings and avoidance/minimization measures related to this species will be included in the EM&CP.

Musk Root

As discussed in Section 4.10.2.1, the Applicant completed a survey for the musk root in the area identified by NYNHP as containing a historic population of this species. No musk root were identified in the transmission line corridor, and as such the Project will not affect this species.

Additional State-listed Plants

The remaining State-listed plants are identified as being present in the Hudson River marshes. Because construction of the submarine transmission line is more than 200 ft (61 m) from every habitat identified as potentially containing these species, no impacts to any of the additional State-listed plant species are expected.

4.10.4.4 Terrestrial Corridor Important Habitats: Potential Impacts and Proposed Mitigation

Important Bird Areas

As stated in Section 4.10.2.3, the proposed terrestrial transmission line corridor crosses the Catskill Peaks IBA for 11 miles in Delaware County. The entire corridor across this IBA is within or immediately adjacent to the NYPA Marcy South ROW. As such, temporary clearing of herbaceous and scrub/shrub vegetation will comprise most of the habitat disturbance in the IBA. Approximately 3 acres of forestland will also be permanently cleared and converted to herbaceous or scrub/shrub vegetation within this IBA. The highest elevation crossed by the proposed corridor within the IBA is 2,464 ft amsl; therefore, the Project will not impact the sub-alpine community associated with the IBA and the at-risk birds that use such area.

Potential impacts to birds associated with fragmentation are typically a concern for large, forested tracts like the Catskills Peaks IBA; however, the Project will not cause forest fragmentation within this IBA due to the co-location with the existing NYPA ROW. NYPA maintains most of the existing ROW permanently in an unforested/early successional condition, and this will not change during operation of the Project. After the transmission line is buried, restoration and revegetation measures will restore vegetative cover as quickly as possible to benefit birds and other wildlife in addition to stabilizing soil in the ROW.

As discussed in Section 4.10.2.3, the transmission line corridor crosses the Lower Hudson River IBA for 24 miles in Westchester County. As discussed in Section 4.10.4.3, the Applicant will consult with USFWS and NYSDEC to determine the need for avoidance and minimization measures for construction within bald eagle winter concentration areas, including those occurring within the Lower Hudson IBA. Any impacts to habitat within this IBA will be temporary and limited almost entirely to within road ROWs. As such, no long-term effects on any birds of concern associated with this IBA are expected. Minor, temporary impacts to waterfowl and other waterbirds may occur on the Hudson River throughout this IBA during marine construction activities.

None of the IBAs within 1 mile of the corridor will be directly affected by the Project. Any noise associated with construction activities is likely to have little if any effect on birds occupying the IBAs given the distance from construction work areas and in consideration of typical maritime activities which take place along the Hudson River in proximity to the IBAs.

Natural Communities

Perched Bog

As discussed in Section 4.10.2.4, the proposed corridor does not cross the identified perched bog community but does cross a delineated wetland which is hydrologically connected to it. The Applicant will implement a variety of BMPs during construction across this wetland, as will be documented in the EM&CP, including but not limited to temporary wetland matting, installation of sediment and erosion control measures, and installation of trench plugs as needed around and through the wetland. Implementation of these BMPs will ensure that the water quality of the perched bog to the southeast of the corridor is not impacted during construction.

Hemlock-Hardwood Swamp

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Floodplain Forest

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Chestnut Oak Forest

As discussed in Section 4.10.2.4, evidence of this community was observed adjacent to the transmission line corridor during field surveys. The exact limits of this natural community in relation to tree clearing areas in this segment of the corridor, if any, are not know currently. If the Applicant determines that any areas of the chestnut oak forest identified by NYNHP will be cleared, they will be identified in the EM&CP along with appropriate avoidance and minimization measures that will be developed in consultation with NYSDEC.

Hemlock-Northern Hardwood Forest

As discussed in Section 4.10.2.4, evidence of this community was observed adjacent to the transmission line corridor during field surveys. The exact limits of this natural community in relation to tree clearing areas in this segment of the corridor, if any, are not know currently. If the Applicant determines that any areas of the hemlock-northern hardwood community identified by NYNHP will be cleared, they will be identified in the EM&CP along with appropriate avoidance and minimization measures that will be developed in consultation with NYSDEC.

Red Maple-Hardwood Swamp

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Brackish Intertidal Mudflats

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 0.2 miles of any brackish intertidal mudflats identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish intertidal mudflats. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish intertidal mudflats are located.

Brackish Tidal Marsh

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 0.2 miles of any brackish tidal marsh identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish tidal marshes. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish tidal marshes are located.

Cliff Community

As discussed in Section 4.10.2.4, a cliff community is located approximately 240 ft (73 m) northeast of the proposed submarine transmission line corridor at Magazine Point on Constitution Island along the Hudson River. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the cliff community.

Pitch Pine-Oak-Heath Rocky Summit

As discussed in Section 4.10.2.4, a pitch pine-oak-heath rocky summit community is located approximately 800 ft (244 m) northeast of the proposed submarine transmission line corridor at Magazine Point on Constitution Island. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the pitch pine-oak-heath rocky summit community.

Brackish Subtidal Aquatic Bed

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 1 mile of any brackish subtidal aquatic bed identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish subtidal aquatic bed. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish subtidal aquatic beds are located.

Rocky Summit Grassland

As discussed in Section 4.10.2.4, a rocky summit grassland community is located approximately 550 ft (168 m) northeast of the proposed submarine transmission line corridor on the Hudson River shoreline. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the rocky summit grassland community.

Attachment L

Revised Exhibit 4

Clean Path New York LLC and the

New York Power Authority

Clean Path New York Project

Article VII Application

Exhibit 4

Environmental Impact

February 2023

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ACRONYMS AND ABBREVIATIONS

ACDS	Agriculture and Community Development Services
ACHP	Advisory Council on Historic Preservation
amsl	Above Mean Sea Level
Applicant	New York Power Authority and Clean Path New York LLC
APE	Areas of Potential Effect
ASMFC	Atlantic States Marine Fisheries Commission
BBA	Breeding Bird Atlas
BMP	Best Management Practice
BOEM	Bureau of Ocean and Energy Management
BVB	Buchanan Village Board
CBRA	Cable Burial Risk Assessment
CARP	Contaminant Assessment and Reduction Project
CHPE	Champlain Hudson Power Express
CLCPA	Climate Leadership and Community Protection Act
CONMAP	Continental Margin Mapping
CPNY	Clean Path New York LLC
CRIS	Cultural Resource Information System
CSO	Combined Sewer Overflow
CWA	Clean Water Act
D&H	Delaware and Hudson
DCAFPB	Delaware County Agricultural and Farmland Protection Board
DIN	Dissolved Inorganic Nitrogen
DPS	Distinct Population Segment
DSM	Digital Surface Model
DWM	Dwarf Wedgemussel
ECL	Environmental Conservation Law
EFH	Essential Fish Habitat
EM&CP	Environmental Management and Construction Plan
EMF	Electromagnetic Fields
EPA	U.S. Environmental Protection Agency
ERID	East River Ichthyology Database
ERM	Environmental Resource Mapper
FEIS	Final Environmental Impact Statement

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FGEIS	Final Generic Environmental Impact State
FMP	Fishery Management Plan
ft	Feet
FWA	Freshwater Wetlands Act
G&G	Geotechnical and geophysical
GARFO	Greater Atlantic-Regional Fisheries Office
GE	General Electric
GHG	Greenhouse Gas
HAB	Horizontal Auger Boring
HAPC	Habitat Area of Particular Concern
HDD	Horizontal Directional Drill
HDPE	high-density polyethylene
HNERR	Hudson River National Estuarine Research Reserve
HNLC	High-Nutrient, Low-Chlorophyll
HRBMP	Hudson River Biological Monitoring Program
HRG	High-Resolution Geophysical
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IBA	Important Bird Area
IPaC	Information for Planning and Consultation
IVM	Integrated Vegetation Management
kV	Kilovolt
LSZ	Landscape Similarity Zones
m	Meter
MAFMC	Mid-Atlantic Fishery Management Council
MARs	Marine Archaeological Resources
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MPC	Master Plan Committee
MSB	Mackerel, Squid, and Butterfish
MTA	Metropolitan Transportation Authority
MW	Megawatt

NAVD88	1988 North American Vertical Datum
NEFMC	New England Fisheries Management Council
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NLEB	Northern Long-Eared Bat
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NRHP	National Register of Historic Places
NSR	New Source Review
NWI	National Wetlands Inventory
NYCDEP	New York City Department of Environmental Protection
NYCDOT	New York City Department of Transportation
NYC Parks	NYC Department of Parks & Recreation
NYCRR	New York State Codes, Rules and Regulations
NYHOPS	New York Harbor Observing and Prediction System
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSAGM	New York State Department of Agriculture and Markets
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSDPS	New York State Department of Public Service
NYSEG	New York State Electric and Gas Corporation
NYSERDA	New York State Energy Research and Development Authority
NYSHPO	New York State Historic Preservation Office
NYSM	New York State Museum
NYSOGS	New York State Office of General Services
O&M	operation and maintenance
OPRHP	New York State Office of Parks, Recreation and Historic Preservation
NYSPSC	New York State Public Service Commission
PAH	Polycyclic Aromatic Hydrocarbons
PBF	Physical and Biological Features
PCB	Polychlorinated Biphenyls
PFR	Public Fishing Rights
PIA	Project Impact Area

POI	Point of Interconnection
POTW	Publicly Owned Treatment Works
ppb	Parts per Billion
ppt	parts per thousand
PSL	Public Service Law
REMAP	Regional Environmental Monitoring and Assessment Program
RHA	Rivers and Harbors Act of 1899
ROW	Right-of-Way
SAV	Submerged Aquatic Vegetation
SCFWH	Significant Coastal Fish and Wildlife Habitats
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SPDES	State Pollutant Discharge Elimination System
SPI	Sediment Profile Imagery
SRHP	State Register of Historic Places
SWAP	New York State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TAC	Technical Advisory Committee
TDI	Transmission Developers Inc.
TSS	Total Suspended Solids
U.S.C.	United States Code
UMCES	University of Maryland Center for Environmental Science
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VSA	Visual Study Areas
VSR	Visually Sensitive Resources
WDR	Wetland Delineation Report
WQC	Water Quality Certificate
WRP	Waterfront Revitalization Program
YOY	Young-of-the-Year

EXHIBIT 4. ENVIRONMENTAL IMPACT

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

4.1 Introduction

The New York Power Authority (NYPA) and Clean Path New York LLC (together the Applicant) proposed Clean Path New York (CPNY) in response to the Tier 4 solicitation issued by the New York State Energy Research and Development Authority (NYSERDA) in January 2021 (T4RFP21-1). The purpose of the Tier 4 program is to increase the penetration of renewable energy into the downstate region, which is necessary for the State of New York to be able to achieve its objective of 70% renewable energy by 2030. Upon completion, CPNY is estimated to reduce fossil fuel-fired generation from the statewide electric sector by 20-22% annually and avoid 49 million tons of CO2 emissions through 2040. Governor Kathy Hochul announced in September 2021 that CPNY was recommended to receive a contract award, and the New York State Public Service Commission (NYSPSC) subsequently approved that selection and the CPNY's contract in April 2022.

CPNY consists of a portfolio of renewable energy resources located in upstate New York and an approximately 178-mile-long, 1,300-megawatt (MW) High Voltage Direct Current (HVDC) transmission line. The transmission line will run from a point of interconnection (POI) located at the Fraser Substation in Delaware County to a POI located at the Rainey Substation in Queens. The HVDC transmission line (and associated transmission facilities as described below) are the subject of this application and are hereafter referred to as the Project.

This application is being submitted to the Commission pursuant to Article VII of the Public Service Law (PSL).

The Project includes:

- An approximately 178-mile-long underground/submarine ±400-kilovolt (kV), 1,300-MW HVDC transmission line consisting of the following components:
    - An underground transmission line that begins at a converter station in Delaware County. It follows existing right-of-way (ROW) owned or controlled by NYPA, New York State Electric and Gas Corporation (NYSEG), Metropolitan Transportation Authority (MTA) Metro-North Railroad, New York State Department of Transportation (NYSDOT), and New York City Department of Transportation (NYCDOT) for 131 miles, terminating at a converter station in Queens.
    - A submarine transmission line which is in the Hudson, Harlem, and East Rivers for 47 miles.
    - Six landfalls where the transmission line either enters or exits the Hudson, Harlem, and East Rivers: Newburgh-Beacon Bridge Landfall; Charles Point Landfall; Croton Point Landfall; two Randall's Island Landfalls (East and West); and Lawrence Point Landfall.
- A converter station located in Delaware County (northern converter station), with an approximately 1-mile-long underground 345-kV High Voltage Alternating Current (HVAC) transmission line following existing NYPA and NYSEG ROW to the POI at Fraser.
- A converter station located at the Astoria energy complex in Queens (southern converter station), with an approximately 3-mile-long underground 345-kV HVAC transmission line following existing NYCDOT ROW to the POI at Rainey.

This Exhibit is organized as follows:

- Sections 4.1.1 through 4.1.5 include an overview of the Project area and description of construction methods.
- Sections 4.1.6 and 4.1.7 describe operation of the Project facilities.
- Sections 4.2 through 4.13 provide detailed discussions of each resource area, subdivided into existing conditions and potential impacts and mitigation measures.
- Section 4.14 discusses additional mitigation measures, including topics as required by Article VII regulations.

4.1.1 Project Area Overview

The Project area is grouped into the following components for discussion purposes in this Exhibit: terrestrial transmission line corridor, submarine transmission line corridor, transmission line landfalls, and converter stations. Each component is shown on Figure 4-1 (see Attachment 1 to this Exhibit) and described below.

4.1.1.1 Terrestrial Transmission Line Corridor

The proposed terrestrial transmission line corridor extends for a total of 131 miles across portions of Delaware, Sullivan, Orange, Westchester, and New York Counties. It is mostly contained within the existing NYPA Marcy South ROW (NYPA ROW[1]), NYSDOT I-84 and U.S. Route 9 (Route 9) ROWs, and other ROWs owned or controlled by NYSEG, MTA Metro-North Railroad, and NYCDOT.

This corridor is variable in width to allow the Applicant flexibility to micro-site the transmission line based on environmental and land use conditions identified prior to installation. It varies in width from approximately 40 to 1,800 feet (ft) (12 to 549 meters [m]) and generally corresponds to the width of existing ROW within which the transmission line is located. Throughout the approximately 127 miles of the terrestrial corridor between the two converter stations, two +/- 400-kV HVDC cables are anticipated to be installed underground in separate conduits. A fiber optic cable system will be installed alongside the high voltage transmission cables to coordinate monitoring of the cable temperature and condition which can assist in fault location detection as well as real-time ampacity rating of the cables, ensuring reliable power transmission. The fiber optic cables will be installed in dedicated conduits alongside but separate from the transmission cables. For the approximately 4 miles of the terrestrial corridor between the points of interconnection and the converter stations, six 345-kV HVAC cables are anticipated to be installed underground in separate conduits. Direct disturbance for installation will typically be approximately 40 ft (12.2 m) wide, including approximately 3 ft (0.9 m) for the cable trench itself plus the additional width for soil sidecast and equipment travel, although disturbance will be wider in some areas due to site-specific conditions such as steep slopes. Following construction, the Applicant expects to maintain an approximately 40-ft-wide (12.2-m-wide) operational corridor for the terrestrial transmission line, although this width will vary depending on the type of ROW and existing management already in place.

4.1.1.2 Submarine Transmission Line Corridor

The submarine transmission line corridor extends for 47 miles in the Hudson, Harlem, and East Rivers through Orange, Putnam, Westchester, Rockland, New York, and Bronx Counties. It is variable in width to

[1] "NYPA ROW" as referenced in this Application refers to NYPA's easement to maintain and operate the Marcy South transmission line.

allow the Applicant flexibility to micro-site the transmission line based on environmental and riverbed conditions identified prior to installation. It varies in width from approximately 260 to 3,000 ft (79 to 914 m) and generally corresponds to the Project's geophysical survey corridor. Throughout this submarine transmission line corridor, two submarine cables are anticipated to be installed as a bundle into a single trench within the riverbed. Fiber optic cables are expected to be bundled together with the HVDC submarine cables and laid and buried in the riverbed with the transmission cables. Direct disturbance for installation will depend on the amount of space required obstruction clearance/riverbed preparation. A typical burial tool is approximately 23 ft (7 m) wide (skid to skid) and 32 ft (10 m) long, which represents the surface area of contact disturbance to the riverbed during cable installation with a burial tool. Disturbance only occurs at the time of burial. Additional riverbed disturbance outside the width of the burial tool may be required (i.e., obstruction clearance, riverbed preparation, and additional cable protection), and will be quantified during further design phases as part of the EM&CP. The final burial tool surface area (width and length) will also be refined for the EM&CP.

It is anticipated that anchoring of the submarine cable installation vessel in support of installation activities will primarily occur within the Project corridor, but may extend outside the corridor where there are site constraints, vessel maneuverability requirements, refinements to the proposed route, equipment requirements, etc. Any anticipated anchoring outside of the Project corridor will be further coordinated with agencies. All anchoring activities will be temporary and will progress with the cable installation activities.

Because the submarine transmission line will be buried under the riverbed, the area of operational impact for the submarine cables is limited to the footprint of the cable protection measures and any long-term bathymetry changes to facilitate installation of the cables (e.g., dredging, see Section 4.1.2). Cable protection, where necessary, would occupy an area over the submarine cables that is designed for the site-specific conditions and in accordance with the crossing agreement. Pre-sweeping and/or dredging will be required in limited areas of the submarine transmission line corridor as described further below.

4.1.1.3 Transmission Line Landfalls

The proposed Project area includes six landfalls at the intersection points between land and the Hudson, Harlem, and East Rivers. The landfall sites are Newburgh-Beacon Bridge in the Town of Newburgh, Orange County; Charles Point in Peekskill, Westchester County; Croton Point in the Village of Croton-on-Hudson, Westchester County; Randall's Island West and Randall's East in New York County; and Lawrence Point in Queens County. At the six landfall locations, the corridor varies in width from about 150 to 800 ft (45.7 to 243.8 m) to allow sufficient space for horizontal directional drill (HDD) operations which are anticipated to require an approximately one-acre construction workspace on land.

4.1.1.4 Converter Stations

The proposed location for the northern converter station is on two parcels totaling approximately 52 acres under control by NYPA in the Town of Delhi, Delaware County. The proposed location for the southern converter station site covers approximately 5 acres of developed land controlled by NYPA within the Astoria energy complex in Queens County.

4.1.1.5 Environmental Studies Completed *(16 NYCRR § 86.5(a))*

16 NYCRR § 86.5(a) The applicant shall submit a statement describing any study which has been made of the impact of the proposed facility on the environment. That statement shall include a description of the methods employed in making that study and a summary of its findings.

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

Field surveys, which were conducted in 2021 and 2022, assessed physical conditions (e.g., surface waters/hydrology, wetlands, topography, geology, soils), biological resources (e.g., vegetation, wildlife, threatened and endangered [T&E] species), cultural resources (e.g., historic and archaeological), land use, visual resources, electromagnetic fields (EMF), and noise. The description of the methods employed in conducting the studies and a summary of their findings is included in Sections 4.2. through 4.12 of this Exhibit.

Desktop evaluations included, but were not limited to, review of county soil surveys, aerial photography, United States Geological Survey (USGS) topographic maps, National Wetlands Inventory (NWI) maps, New York State Department of State (NYSDOS) habitat maps, New York State Department of Environmental Conservation (NYSDEC) freshwater wetland maps, NYSDEC-mapped streams, U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool, National Hydrography Database, New York State Historic Preservation Office (NYSHPO) Cultural Resource Information System (CRIS) maps, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) floodplain mapping.

Consultations with local municipalities, federally recognized Native American Nations, and state and federal agencies were conducted through letters, telephone and electronic communication, virtual meetings, and onsite field reviews. These agencies included the New York State Department of Public Service (NYSDPS), New York State Office of Parks, Recreation, and Historic Preservation (OPRHP), NYSDEC, New York Natural Heritage Program (NYNHP), New York State Department of Transportation (NYSDOT), NYSDOS, New York State Office of General Services (NYSOGS), United States Army Corps of Engineers (USACE), USFWS, United States Coast Guard (USCG), and National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). Appendix A includes copies of key correspondence and the Public Involvement Plan (**Appendix B: Public Involvement Plan** of this Application) includes a summary of agency meetings.

Separate studies were conducted to address specific resources. The results of these studies are addressed in the following reports: Coastal Zone Consistency Assessment (Appendix B) Visual Resource Assessment (Appendix C), Phase IA Archaeological Sensitivity Assessment (Appendix D), Phase IA Archaeological Sensitivity assessment: Croton Point Route Assessment (Appendix D), Phase IB Archaeological Survey Report (Appendix D), Phase I Report Part 1 of 2 - Marine Cultural Resources Assessment (Appendix E), Architectural Reconnaissance Survey Northern Converter Station (Appendix F), Architectural Reconnaissance Survey Southern Converter Station (Appendix F), Geophysical Survey Report (Appendix G), Wetland Delineation Report (WDR) (Appendix H), Sediment Turbidity Modeling Report (Appendix I), Phase I Bog Turtle Habitat Survey Report (Appendix J), Phase II Bog Turtle Survey Report (Appendix J), Pre-construction Noise Impact Assessment (Appendix K), and Magnetic Field Simulation Report (Appendix L).

A summary of the results of the desktop and field investigations and separate studies is presented throughout this Exhibit for each resource area and Project component.

4.1.2 Construction Methodology: Submarine Components

The proposed submarine transmission line routes though sections of the Hudson, Harlem, and East Rivers. Submarine cable lay and burial is anticipated for the route segments through the Hudson and Harlem River sections. The route segment that crosses through the East River section (between the West Randall's Island

Landfall and the Lawrence Point Landfall) is proposed to be constructed via trenchless construction methods (i.e., submarine cable burial is currently not proposed within the East River).

The design burial depth for submarine cable installation is expected to vary along the route, depending on site-specific conditions and protection requirements. As the Project progresses, design burial depths will be developed following the completion of planned additional data collection (i.e., geotechnical data), assessment, and stakeholder coordination.

As part of the detailed final design process, a Cable Burial Risk Assessment (CBRA) will be conducted using the geophysical and geotechnical survey data to refine the understanding of existing conditions along the cable corridor and assess submarine cable installation risks and limitations. The CBRA will involve a quantitative analysis of the anthropogenic and natural conditions along the proposed corridor. Findings from the CBRA will be used to refine the proposed transmission line route and associated design burial depths and inform additional submarine cable protection needs, which will be incorporated in the EM&CP for the submarine portion of the Project. In areas where the design burial depth is unachievable due to site constraints (e.g., utility and infrastructure crossings, challenging substrate), the transmission line may be installed at a shallower burial depth with additional cable protection measures installed above.

Additional stakeholder engagement and input will be gathered from the navigation community, permitting agencies, and others throughout the developmental process of the design burial depths. It is the Applicant's intention for the final designed burial depths to be optimized to the extent practical to reduce/mitigate risk/impact to the cables, environment, stakeholders, and construction complexity.

For industry example purposes only, the burial depths permitted for the Champlain Hudson Power Express (CHPE) project are provided below as per USACE (2015) for the similar sections of routing through the Hudson, Harlem, and East Rivers. These are the burial depths documented in the USACE (2015) permit and may or may not have changed since this permit publication.

- Hudson River – outside navigation channels: 7 ft (2.1 m) below existing bottom;
- Hudson River – within maintained navigation channel: 9 ft (2.7 m) below existing bottom;
- Harlem River – inside navigation channel: 6 ft (1.8 m) in rock and 8 ft (2.4 m) elsewhere, below congressionally authorized mapped navigation channel depth -15 ft (1.2 m) Mean Low Water (MLW);
- Harlem River – outside navigation channel: 4 ft below existing bottom; and
- East River – Inside the navigation channel: 15 ft (4.6 m) below congressionally authorized mapped navigation channel depth: -35 ft (10.7 m) MLW.

The typical key stages of submarine transmission line installation, which are pre-sweeping, grapnel run, dredging, and cable lay and burial, are described in more detail in the following sections.

4.1.2.1 Pre-Sweeping

Pre-installation sweeping (or "pre-sweeping") operations are typically required when mobile sediments, sand waves, or steep slopes are found along the cable installation route. The purpose of pre-sweeping activities is to level out the riverbed terrain for the burial tool to navigate across; this activity occurs just prior to cable installation. The sweeping clears the mobile sediment (i.e., sand ripples and sand waves) down to the stable riverbed, into which the cable will be buried. Appropriate calculations will be conducted to determine if anticipated future accretion could affect the performance of the transmission line at the

designed burial depth. These mobile sediments such as sand waves are also excluded during the calculation of the required burial depth for the protection of the cable, as they are dynamic.

4.1.2.2 Grapnel Run

A grapnel run involves a vessel following the proposed cable route with a grapnel/hook tool to remove/recover small debris prior to cable installation. The pre-installation grapnel run typically takes place several days prior to cable installation to ensure any shallow buried or surface debris is removed along the route. The grapnel run helps to mitigate the risk of debris impacting the cable or the process of burial. Typical debris removed by the grapnel could include chains, trees, tires, wire hausers, ropes, fishing tackle, and similar. However, larger debris and obstructions identified along the route in the geophysical survey may require site-specific removal operations.

4.1.2.3 Dredging

Dredging activities could be required for riverbed preparation and/or cable installation/burial works. Dredging is typically conducted via hydraulic, mechanical, or specialty methods. Typical equipment utilized for mechanical dredging includes a barge or vessel equipped with a clamshell buck, backhoe, or budget ladder dredge; typical equipment for hydraulic methods includes a barge or vessel outfitted with a plain suction, trailing suction, or cutter dredge. Alternatively, specialty tools such as a mass flow excavator, which uses forced water pressure to displace sediment away from the targeted area of the riverbed, may also be used instead of physically collecting and removing the sediment.

If/where dredging is determined to be needed for riverbed preparation, the purpose of the dredging activities would be to conduct pre-sweeping activities as described previously (i.e., removal of mobile sediments or leveling of steep slopes) or to reduce the riverbed elevation to allow vessel access (i.e., in areas of shallow water). Dredged sediment for riverbed preparation purpose will not be returned to the same location and will be disposed of at an approved offsite location.

If/where dredging is utilized to support submarine cable installation/burial, the purpose of the dredging activities would be to lower the local riverbed elevation to a pre-determined trench depth to allow the cable to be installed at the design burial depth. An example of where dredging may be needed to support cable installation/burial is at the proposed landfalls, where the cables must transition from two HDD ducts into a single bundled cable system installed with the cable burial tool. Dredged sediment for the purpose of cable installation/burial may be deposited over the cable to return the riverbed to pre-installation conditions, subject to suitability. The actual method of dredged material management will be based on sediment sampling and consultation with regulatory agencies. Additional information on dredged material management and/or disposal will be provided as part of the Applicant's EM&CP.

4.1.2.4 Cable Lay and Burial

As discussed in **Exhibit E-3: Underground Construction**, while the submarine cable installation methods discussed herein are considered typical, cable installed within the Hudson and Harlem River segments may be completed using various methods and equipment, pending final burial depth designs, riverbed conditions, vessel navigation constraints, and final cable installer/contractor.

Cable Lay Vessel/Barge

Submarine cable installation will require a cable lay vessel or cable lay barge for storage of the cable wheel, cable pan-out, and connection/towing of the burial tool. The final vessel/barge to be used for cable lay will depend on factors such as navigation constraints, proposed burial method, and the cable

installer/contractor's available fleet. Industry typical cable lay vessels often require a minimum water depth of approximately 30 ft (9.1 m) due to draft requirements. Thus, in areas where shallower conditions are present, riverbed preparation efforts may be needed (i.e., dredging, as previously discussed), or a specialty shallow draft vessel or barge may be required. Bridge clearance requirements also will influence the cable lay vessel to be used. The Harlem River route segment requires navigation through numerous existing bridges, which may prohibit the use of a typical large cable lay vessel and may require a smaller, specialized vessel or barge.

Cable Burial Tools

Cable installation may occur via separate cable lay and burial activities or simultaneous lay and burial. In the case of separate cable lay and burial, the cable is first laid onto the riverbed surface and then the burial carried out as a separate operation and vessel spread. For simultaneous lay and burial, both operations are carried out from a single vessel as the burial tool lays and buries the cable in a single pass. Burial installation progress rates for both methods are rate restricted to the burial speed achieved by the tool in the given substrate.

The machines utilized for the cable burial vary to accommodate the varying geological substrate of the riverbed into which the cable is being buried. Depending on the design, the cable may feed through or be straddled by the machine, have cable pathways but not always cable depressor devices.

Water Jetting. Burial by a jetting tool is where water is pumped under pressure at a controlled volume (variable high pressure/high flow) through swords with forward- and downward-facing nozzles fed from subsea, machine-mounted pumps.

The burial progress is determined by the substrata removal by either water flow or fluidization into the water column, with the cable being delivered to the depth required before the reconsolidation of the strata back to create the burial coverage by suspended settlement or tide/current movement.

With jetting burial tools, the cable is usually straddled by two jetting swords, and there is no mechanical cable depression system, with the cable settling to the trench bottom once sufficient trench has been exposed allowing the cable to form into the trench under its own weight and natural bend flexibility.

Plowing. Cable plowing is an installation method restricted to simultaneous burial where the cable is fed through the tooling direct from the lay vessel and delivered to the required trench depth in a single operation through the plow share while being towed from the lay vessel.

The plow share is designed to suit the cable bend radius and the required burial depth. With plow burial, the surface disturbance is minimized but the burial can only be achieved in a single pass.

Progress of the burial is determined by the substrata of the riverbed with the forward motion tension controlling the speed of the vessel that is towing the plow. Although plow burial is effective for various substrata, changes in direction (alteration of courses along the route) must be planned to allow for the towing layback to avoid damage to the cable. These course alterations may require extended radius bends to be designed into the installation, taking into consideration distance behind the vessel of the plow and the water depth of the operation.

Trenching. Cable trenchers are usually self-propelled on tracks (but can be skid mounted for certain operations) and are connected to the support vessel via an umbilical. Tooling on a trencher can be configured to suit the substrata utilizing either jetting technology, cutting via blades or teeth mouthed on a chain or a combination depending on the burial depth.

Cable trenchers can be deployed over a pre-installed cable or be used as a lay and bury operation. The progress when used in a lay and bury mode would be determined by burial rates; therefore, the progress of the lay vessel is limited to that speed.

4.1.2.5 Additional Cable Protection

Additional cable protection is typically required in areas where the design burial depth is unachievable or where there is higher risk of impact/exposure of the cables. Thus, additional cable protection is typically required in areas of utility and infrastructure crossings, high risk of riverbed erosion or morphology, increased risk of anchor strike, and challenging substrate conditions (e.g., boulders, bedrock).

Various materials and manufactured products may be used as additional cable protection for the submarine cables. Four common examples are riprap, rock bags, mattresses (e.g., articulated concrete block or rock filled mattresses), and cable protective shells/covers. Riprap used for cable protection is often quarry rock, or similar, and requires a range of rock sizes from smaller bedding stone to larger armor stone. The layering, thickness, and stone sizing would be designed appropriately for the site-specific conditions and hazards. Rock bags and mattresses are manufactured products that can typically be ordered to size, based on design requirements.

Most cable protection is installed following cable lay, as it is placed over top of the installed cable, with the exception of cable protective shells/covers that are typically attached to the cable prior to cable lay. However, in certain scenarios a bedding layer may be required, which is installed along the riverbed prior to cable lay, then followed by installation of the protective overlayer. Ultimately, the design of the additional cable protection is subjective to the site-specific conditions (e.g., bearing capacity, hydraulic forces, space and clearance restrictions, slope) and risks (e.g., anchor strike force, velocity, scour) at each location where needed.

4.1.3 Construction Methodology: Transmission Line Landfall

At the six landfall locations, the transmission line will be installed via HDD beneath the nearshore areas. The environmental impacts of HDD installation will be minimized by drilling underneath the riverbed and the nearshore area using a drilling rig located onshore. The HDD landfalls use a surface-mounted drilling rig that excavates a borehole underneath the ground's surface, typically from a terrestrial location toward an identified exit location within the marine environment. The HDD technique comprises three primary stages termed pilot bore, reaming, and pullback. The pilot bore is launched from the ground surface and steered at depth toward the exit location, establishing the underground path of the landfall installation. Depending on the size of the borehole required, one or more reaming passes are completed to enlarge the borehole for acceptance of a high-density polyethylene (HDPE) conduit. Once the desired borehole size is achieved, an HDPE conduit is fabricated and pulled into the drilled borehole until fully installed through the length of the bore. The submarine HVDC cable will then be pulled through the HDPE conduit in a submarine to terrestrial direction. To facilitate drilling activities, a bentonite and water-based drilling fluid is used to lubricate the drill bit, suspend and remove cuttings from the borehole, and stabilize the borehole from collapse during drilling.

For each considered landfall location, two separate, parallel HDD installations will be needed to accommodate the two submarine cables for individual installation. The submarine cables cannot be installed within a single HDPE conduit due to thermal impacts and submarine cable rating concerns associated with installing HVDC cables at great depth. The HDD installations will need to be separated by an adequate horizontal distance to mitigate thermal impacts. The current HDD landfall strategy assumes the dual HDD installations at each cable landfall location will need to be distanced approximately 40 ft (12.2 m) apart. As

more data are acquired through Project delivery and geotechnical conditions are determined at each landfall, installation depth and separation distance will be further optimized.

Landfall HDD crossings require work areas at the drill entry and exit locations to support construction activities. The terrestrial work areas for a single landfall HDD are typically 200 ft by 200 ft (61 m by 61 m), although the work area depends on site availability and constraints. The size of the in-water work area will depend on the HDD exit strategy implemented during construction. The preferred exit strategy will include dredging a pit at the HDD exit location to contain drilling fluids, with a jack-up barge and other support vessels mobilized to remove drilling fluids from the excavated pit and support the drill string within the marine environment throughout drilling activities. Other exit strategies could include installation of temporary surface casing, drilling from a barge in a submarine to terrestrial direction, or installation of a cofferdam to establish a work area on the riverbed. The suitability of an HDD exit strategy will require further development as more information and geotechnical data are received.

4.1.4 Construction Methodology: Terrestrial Transmission Line

The Applicant anticipates using common trenched and trenchless methods to place the terrestrial cable system underground. Primarily, the Applicant will use open-cut trenches where the terrestrial cables will be within conduits, and the conduits will be directly buried. Concrete encased duct banks will also be used to install the cable depending on the site locations and conditions. Occasionally, the Project will also use trenchless methods, such as HDD, to install the terrestrial cables under heavily trafficked roads, waterbodies, railroads, and other features along the Project route that require a trenchless approach to successfully install the cable. A summary of the anticipated installation methods is provided in the following sections.

4.1.4.1 Site Preparation

Preparation of the construction corridor typically includes survey and corridor marking, installation of erosion and sediment controls, installation of timber matting where needed, clearing, and grading. Clearing and grading will be required to prepare the ROW to allow for construction equipment access and for materials to be delivered to the Project corridor.

4.1.4.2 Trench Excavation

The primary method proposed for terrestrial cable installation is the commonly used practice of open cut trenching. For this method, a trench approximately 5 ft (1.5 m) deep and 3 ft (0.9 m) wide will be excavated. During open cut installation, existing geologic features or environmental concerns may require variable excavation depth and area for different segments.

Prior to commencing the trenching operations, the contractor will implement erosion and sediment controls in accordance with the Project's Stormwater Pollution Prevention Plan (SWPPP), perform all agency and existing utility notifications and utility mark-outs, establish all construction support facilities and access roads, and conduct other site preparation activities. Trench excavation activities will commence following the establishment of the stabilization measures and progress along the ROW. Trenching operation will be performed with an excavator, adequately sized per site constraints.

During excavation activities, materials will be stockpiled next to the trench routes where possible or within roadway corridors. Topsoil will be excavated and segregated into separate stockpiles for reuse. Any excavated materials not suitable for stockpiling or reuse will be removed from the site for suitable disposal. Erosion and sediment controls will be installed around stockpiled material as needed when stockpiles are

left within the Project corridor. The amount of open trench will be limited to the amount of conduit that can be installed within one day.

Groundwater may be encountered at some locations, and dewatering may be required prior to and during conduit installation. All dewatering activities and discharges for the Project will be conducted in accordance with the appropriate permits and/or requirements.

4.1.4.3 Conduit Installation

The non-electrical components (e.g., conduits, spacers) will be installed within the open trench. After laying the conduit for the cables, the conduits will be inspected for damage, continuity, and proper placement and then the trench will be backfilled with thermally approved material. For concrete-encased duct banks, the concrete will be placed around the conduits. For the HVDC segments, two conduits will be installed in the trench; for the HVAC segments, six conduits will be needed because the AC segment will have two cables per phase. Additional conduits will also be installed to receive the fiber optic cables needed for system communication and monitoring.

4.1.4.4 Cable Jointing/Splicing

The Applicant anticipates the need for field-applied HVDC and HVAC cable splices to join lengths of the terrestrial cable facilitating cable installation. The exact locations and quantity of these splices will be determined during the final design and optimized according to a variety of factors including, but not limited to, cable design, final cable routing, cable pulling tension and sidewall pressure, site access and conditions along the construction corridor, and proximity to trenchless installations.

Depending on site conditions, accessibility, and other related factors within the Project corridor, cable splices will be installed in either direct-buried splice pits or in splice vaults. Direct-buried splice pits are proposed to be used primarily in the portion of the corridor within or nearby the NYPA ROW and I-84 ROW as well as other non-paved locations along the terrestrial route where public and vehicular traffic is restricted. These pits will have a concrete slab that will be placed at the bottom of the pit location to make the area workable. Cable ends are then pulled on the slab and a mobile splicing/jointing container is hoisted over the cables providing a safe consistent work environment for the cable jointing. When splicing/jointing works are complete, the container is removed from the location, and the pit is backfilled around the cable with thermally and environmentally acceptable backfill. Stockpiled suitable native materials will be used for subsoil and topsoil backfill over the splice pits during restoration activities. Only marker posts and fiber boxes will remain visible at the grade level, and only if they are required. A typical cross-sectional sketch of the direct-buried splice pits is shown in Sketch 5.1.301 in **Exhibit 5: Design Drawings**.

At other locations where the transmission line is installed under roads and other paved surfaces, reinforced concrete manhole type splice vaults will be installed to house the cable joints. Works at vaulted installations will be like those of the direct buried splice pits except that the cables will be pulled into the vaults instead of onto a slab, and the joints will be applied inside the vault instead of the container environment. When splicing/jointing works are completed, the remaining backfill is applied around the vault and the surface is restored to match pre-existing conditions. At vault locations, only manhole covers will remain visible at the surface. Sketch 5.1.300 and Sketch 5.1.302 in **Exhibit 5: Design Drawings** show typical cross-sectional sketches of the manhole type splice vaults for HVDC and HVAC cables, respectively.

4.1.4.5 Backfilling

The trench, or the duct banks, will be backfilled using suitable native stockpiled materials approved for reuse. Imported materials will only be used as needed for performance requirements or to replace volumes deemed unsuitable for reuse. The backfill materials may vary based on the locations of the trenches, site conditions, public and vehicle access, and other site-related factors. Where appropriate (e.g., NYPA ROW), the segregated topsoil will backfilled last so that the site can be reseeded and restored to pre-existing conditions as will be detailed in the EM&CP.

4.1.4.6 Cable Installation Through the Conduits

Following the cleaning, preparation, and inspection of the conduits, the cable installation process will commence. All terrestrial cables will be carefully pulled into the prepared conduits from vendor-supplied cable reels. Cables will be pulled through the conduits from joint/splice bay locations and then spliced within the vaults. All cable installation methods will comply with the cable manufacturer's installation instructions and requirements. Appropriate lubricants will be used for pulling the cables through the conduits. Details of conduit installations in direct-buried applications as well as in concrete encased duct banks are shown in Sketches 5.1.100 – 5.1.105 in **Exhibit 5: Design Drawings**.

4.1.4.7 Trenchless Crossings

The Project will use trenchless crossing installation to avoid sensitive environmental resources (e.g., streams and wetlands) or other physical obstructions (e.g., highways, railroads) at certain crossing locations. The trenchless installations will either consist of HDD or horizontal auger boring (HAB).

HDD

Terrestrially, HDD crossings will use a surface-mounted drilling rig that drills a borehole underneath the ground's surface. A common water-based drilling fluid is used to lubricate the bore head, return the cuttings to the entrance, and maintain the hole prior to conduit placement. Depending on the size of the hole required, multiple reaming passes may be required to incrementally enlarge the hole. When the target size is achieved, a conduit with a pre-installed lead is pulled through drilled hole so the cable can be pulled through later. Each terrestrial HDD installation will require two extra work areas (on the entry side and exit side) to support these activities. The work areas for HDD are typically 200 ft by 200 ft (61 m by 61 m) on each side of the HDD. A profile view of a typical HDD for a stream crossing is shown in Figure E-3-16 in **Exhibit E-3: Underground Construction**. Similar drawings for road crossing and railroad crossing HDDs are shown in Sketch 5.1.202 and Sketch 5.1.204 in **Exhibit 5: Design Drawings**.

HAB

HAB is a common trenchless method used to excavate boreholes under the earth's surface. Also known as the jack and bore method or simply as auger boring, it uses a rotating helical shaft within a casing to extract soil while advancing the shaft. The spiral edges of the auger, like a large screw, remove the excavated soil as the operation progresses. Auger boring can be used in different ground conditions although it is best suited for softer soil types. The Applicant proposes to use the HAB method of trenchless installation to cross under roads, railroads, and utilities where bore length is relatively short and the soil conditions are favorable. The method is well-established and widely used for installing rigid pipes and casings and is also known to be cost-effective and efficient.

During installation, the auger machine is placed securely in a launching pit excavated to the required depth. The machine then uses both torque and thrust to move the auger with its casing forward along a pre-determined horizontal path. The pipe casing is laid in sections, one after another, as forward sections progress through the borehole. With HAB, the creation of the borehole and the installation of the pipe are accomplished simultaneously.

This method requires two excavated pits – the launching pit and the receiving or exit pit. Excavation is started from the launching pit, and sufficient space is provided for workers and machinery to operate safely. The dimensions of the pits depend on the size and length of the casing being installed and on the depth of boring. Typically, the pit bottoms are excavated and backfilled with crushed stone to provide sufficient support to the equipment. Depending on the site location and conditions, the excavated soil may be left next to the pits or may be removed from the site in trucks if needed. If soil or other materials from excavations are left within the Project corridor, proper erosion and stormwater mitigation measures will be installed. If dewatering at any of the pits is needed, the water may be discharged on-site using proper treatment measures, placed into the storm drainage system if present, or if necessary can be stored in appropriate containers for disposal off-site. This activity will depend on the water quality, site conditions and regulatory requirements. Once the installation is complete, the entry and exit pits will be returned to pre-construction conditions. Typical profiles for stream crossing and railroad crossing auger bores are included in **Exhibit 5** – Sketch 5.1.205 and 5.1.201.

4.1.4.8 Other Stream Crossing Methods

Where not crossed by trenchless methods, stream crossings will be accomplished using methods to minimize impacts to stream flows, streambed substrates, and slope (gradient). One available technique for stream crossings will involve dry-ditch techniques where water, if present, will be diverted around the work area. Two methods will be considered, flume and dam and pump. For the flume method, flume pipe(s) are installed over the trench prior to trenching (or during trenching should an unforeseen precipitation event create flow), which remain in place and are maintained until restoration of the waterbody is complete. The size and number of flume pipes is sufficient for maximum anticipated flows. Excavation equipment located on the stream banks works around the flume pipe(s) during excavation. The conduit is threaded under the flume pipe, and the ditch is backfilled while flows are maintained through the flume pipe(s) and downstream. The dam and pump method for crossing streams temporarily diverts stream flow around construction area activities to a discharge point downstream of the work area. This method consists of diversion structures used to temporarily dam the waterbody, which can consist of one or more of the following: imported concrete jersey barriers, water bladder, port-a-dams, steel plates, and/or sandbags. The selection of the dam type or material depends on the stream or waterbody depth, flow velocity, channel width, and type. For minor, ephemeral, and some intermittent streams, flow may be absent (dry) at the time of crossing, which would eliminate the need for isolation of stream flow during construction.

4.1.5 Construction Methodology: Converter Stations

The converter station sites will be surveyed and staked prior to the start of construction activities, and site controls, access, and security for construction will be installed. Construction will begin with the excavation and installation of stormwater management controls, followed by excavation for building foundations, columns, footings, and slabs. Excess spoil and materials excavated for the facility foundations and infrastructure will be properly managed and disposed off-site, unless suitable for reuse on-site. After pouring and setting foundations, electrical infrastructure, structures, and buildings will be installed. Finally, site restoration (including any temporary staging or workspaces), painting, permanent fencing, and security controls will be completed at the sites.

4.1.6 Operation of Submarine Components

The submarine cables will be monitored during operations through distributed temperature and distributed vibration sensing equipment. The distributed temperature sensing system will be able to provide real-time monitoring of temperature along the submarine cable route, alerting the Applicant if the temperature changes, which often is the result of scouring of material and cable exposure. The distributed vibration sensing system will provide real-time vibration monitoring close to the cables, indicating potential dredging activities or anchor drag occurring close to the cables. Upon receiving any such alert, the Applicant will investigate the cable condition and identify and implement corrective actions, if necessary. If one of the submarine cables faults, the portion of the cable will be spliced and replaced with a new, working segment.

4.1.7 Operation of Terrestrial Components

Vegetation will be managed to ensure safe operation of, and access to, the terrestrial underground transmission cable. Typically, an approximately 40-ft-wide (12.2-m-wide) area centered on the transmission line will be kept clear of woody vegetation to facilitate inspection and maintenance activities although many segments of the terrestrial corridor are existing ROWs already subject to vegetation management. The terrestrial transmission line will be inspected regularly based on manufacturer-recommended schedules and in accordance with the Applicant's vegetation management plan to be developed and included in the EM&CP.

4.2 Land Use

This section evaluates existing land uses along and adjacent to the terrestrial transmission line corridor, transmission line landfalls, and converter stations. This section also evaluates whether the Project preserves the natural landscape and minimizes changes or excessive conflict with any present or future planned uses. In addition, land use policies and regulations for the counties and individual cities, towns, and villages within the Project area were reviewed and evaluated to determine whether the proposed transmission facilities "minimize conflict with any present or future planned land use." **Exhibit 7: Local Ordinances** includes a detailed assessment of local ordinances for counties and municipalities.

4.2.1 Land Use Studies and Analysis

The land use information provided in this section is based on observations recorded during field surveys and supplemented with a desktop assessment using aerial photography and the USGS National Land Cover Database (NLCD 2019). The Applicant also evaluated New York State Coastal Zone Management requirements and land use plans, local comprehensive plans, and the New York City Waterfront Revitalization Program (WRP).

4.2.2 Existing Land Use

Existing land uses within the Project area are described in the following sections. Figure 4-2 (see Attachment 1 to this Exhibit) shows the NLCD cover types identified in the Project area Table 4-1 summarizes NLCD cover types within the terrestrial transmission line corridor.

Table 4-1. NLCD Cover Types within the Terrestrial Transmission Line Corridor

Land Cover Category	Acreage within Terrestrial Transmission Line Corridor	Percent of Total Terrestrial Transmission Line Corridor
Barren Land (rock/sand/clay)	14.8	1%
Cultivated Crops	19.3	1%
Deciduous Forest	173.3	6%
Developed High Intensity	169.6	6%
Developed Low Intensity	42.8	1%
Developed Medium Intensity	50.3	2%
Developed Open Space	54.6	2%
Emergent Herbaceous Wetland	157.8	5%
Evergreen Forest	3.2	<1%
Grassland/Herbaceous	516.3	18%
Mixed Forest	105.6	4%
Pasture/Hay	73.8	3%
Shrub/Scrub	1,350.1	47%
Waterbody	24.8	1%
Woody Wetland[a]	127.6	4%
Total	**2,883.9**	**100%**

[a] Scrub-shrub wetlands are included in woody wetland acreage calculations.

4.2.2.1 Terrestrial Transmission Line Corridor

The terrestrial corridor is largely contained within the NYPA Marcy South ROW for the first 93 miles from the Fraser Substation to the intersection of I-84 in the Town of Wallkill, Orange County. Where the corridor is located within the existing NYPA ROW, land cover is predominately characterized as grassland/herbaceous and scrub/shrub (e.g., maintained ROW). Exceptions include approximately 5,000 ft (1,524 m) of ravine crossings where land cover is forested because the ROW has not been cleared and is maintained as open land. The terrestrial corridor deviates from the NYPA ROW at three locations, totaling approximately 3.8 miles, because of various constructability considerations (see **Exhibit 3: Alternatives**, Section 3.6.2, for discussion of these deviations: the Beaver Kill Deviation; Neversink River Deviation; and MTA Railroad Deviation). Land cover along these segments of the corridor is a mix of forestland, grassland/herbaceous, and shrub/scrub. Adjacent land cover along the 93-mile stretch of the terrestrial corridor between Delhi and Wallkill is primarily rural residential and forestland.

Within the Town of Wallkill, Orange County, the terrestrial corridor enters and runs within the I-84 ROW for 23 miles. The corridor in this segment is contained within the median of I-84 where the land cover is primarily grassland/herbaceous. Exceptions include scattered patches of forestland. Adjacent land cover in this segment varies from scattered forest and agricultural land and rural residential in the western end to high-intensity commercial, industrial, and developed land in the eastern end.

The terrestrial corridor on the east side of the Hudson River is within the Route 9 ROW for 6 miles, where adjacent land cover includes a mix of developed high intensity (roadways, residential, commercial) and forestland. Other segments of the terrestrial corridor east of the Hudson River along various roadways in Westchester County cross a mix of developed areas and parkland (Croton Point Park).

The remainder of the terrestrial corridor crosses Randall's Island and New York City roadways within Queens. Land cover on the Randall's Island segment is primarily parkland that is maintained as athletic fields, while land cover along the remainder of the corridor through Queens is developed high intensity.

4.2.2.2 Transmission Line Landfalls

- The Newburgh-Beacon Bridge landfall is in Newburgh, Orange County, on the west bank of the Hudson River and immediately south of the Newburgh-Beacon Bridge. The site is currently maintained as open lawn.
- The Charles Point landfall is currently an undeveloped and mostly forested parcel.
- The Croton Point landfall is within Croton Point Park, a Westchester County Park. Land use is developed open space.
- The Randall's Island West landfall is on the west side of Randall's Island in New York County. The landfall site is on Randall's Island Park near an area used as athletic fields. The Randall's Island East landfall site is also near an area used as athletic fields.
- The Lawrence Point landfall site is located on Lawrence Point in Queens County on a parcel used as industrial, electric utilities, and associated office space.

4.2.2.3 Converter Stations

Land use within the northern converter station site is a mix of agriculture (hayfield) and forestland. The surrounding land use is primarily undeveloped forest and developed low intensity (i.e., rural residential). Land use within the 5-acre southern converter station site within the Astoria energy complex is developed high intensity (industrial), and the surrounding land use is also developed high intensity (mix of industrial and commercial).

4.2.3 Land Use Plans and Policies

State and local land use plans and policies, including local park lands and recreational area policies, were reviewed for New York as a whole and for the counties, cities, towns, and villages crossed by the terrestrial transmission line corridor. Attachment 2 contains a summary of each plan and policy along with analysis of the Project's compliance with each plan.

4.2.4 Agricultural Districts

Article 25-AA of the Agriculture and Markets Law, the Agricultural Districts Law, authorizes the creation of local agricultural districts to encourage land improvement and use for production of food and other agricultural products. The Agricultural Districts Law and the Agricultural and Farmland Protection programs have influenced municipal comprehensive plans and zoning regulations, protecting farmers against local laws that may unreasonably restrict farm operations located within an agricultural district (Cornell IRIS and NYSAGM 2019). Table 4-2 summarizes agricultural districts crossed by the terrestrial transmission line corridor, and Figure 4-3 (see Attachment 1 to this Exhibit) shows the locations of the agricultural districts. The terrestrial corridor crosses 15.7 miles of five agricultural districts in Delaware, Sullivan, and Orange Counties.

Table 4-2. Agricultural Districts Crossed by the Terrestrial Transmission Line Corridor

Agricultural District	Town	Distance Crossed (miles)
Delaware County		
DELA002	Delhi	1.5
DELA006	Colchester, Hancock	2.3
	Total	3.8
Sullivan County		
SULL001	Callicoon, Liberty	4.7
SULL004	Liberty, Bethel, Thompson	3.8
	Total	8.5
Orange County		
ORANc01	Deerpark, Mount Hope, Wawayanda	3.4

4.2.5 Parks and Recreational Resources

Parks and recreational resources crossed by the terrestrial transmission line corridor are listed and summarized in Table 4-3. These locations are also shown on Figure 2-3 in **Exhibit 2: Location of Facilities**.

4.2.6 Potential Land Use Impacts and Mitigation Measures

As introduced above, the terrestrial transmission line corridor follows existing ROW owned or controlled by NYPA, NYSEG, MTA Metro-North Railroad, NYSDOT, and NYCDOT for all but approximately 3.8 miles of the total 131-mile terrestrial corridor length. Construction of the terrestrial transmission line will result in mostly temporary and localized impacts to land use. An increase in vehicle traffic and activity will occur during the active construction period. Because the Project predominantly uses existing utility and roadway ROWs, impacts from construction activities will be minimized and are anticipated to be similar in nature to other utility installations or road improvement activities in the area. Adjacent landowners will be provided timely information about planned construction activities and schedule, and work will be coordinated with NYSDOT, NYCDOT, and other entities, as applicable. Permanent changes to land use from the terrestrial transmission line will be limited to isolated areas where forestland is converted to grassland/herbaceous or scrub/shrub habitat in the permanent ROW, mainly in the 3.8 miles where the corridor deviates from the NYPA ROW. Please see Section 4.6.5.1 for discussion of forest clearing and other impacts to vegetation communities.

Unless otherwise waived by NYSPSC, the Applicant will perform all construction activities in accordance with local zoning requirements or other regulatory approvals as detailed in **Exhibit 7: Local Ordinances**.

Because the transmission line will be located underground, there are no anticipated ongoing impacts to land uses within the corridor and to adjacent properties during operations.

Construction of the northern converter station on an undeveloped parcel will alter the landscape in the immediate area but, given the location of the site adjacent to parallel sets of NYPA and NYSEG overhead transmission lines and within 1 mile of the Fraser Substation, any localized land use effects of this alteration will be minimized. The southern converter station will have no impact on surrounding land use because it is located within an existing industrial site.

Table 4-3. Parks and Recreational Resources Crossed by the Terrestrial Transmission Line Corridor

Park and Recreational Resources	Town/County	Figure 2-3 Page Number	Crossing Distance (ft)	Acreage within Corridor	Description
West Platner Brook Unit	Town of Delhi, Delaware County	5	1,480	12.4	The West Platner Brook Unit is an 83-acre nature preserve controlled by NYCDEP as part of the NYC Watershed Protection Program. The nature preserve is commonly used for activities such as hiking, fishing, hunting, and trapping.
East Terry Clove, Bagley Brook Unit	Hamden Township, Delaware County	10	2,670	10.6	The Bagley Brook Unit encompasses 481 acres of land used for recreational and public access areas and is controlled by NYCDEP as part of the NYC Watershed Protection Program. Activities that take place on this land include hiking, fishing, hunting, and trapping.
Tomannex State Forest	Town of Hancock, Delaware County	21, 24, 25	20	<0.1	The Tomannex State Forest is 1,036 acres of State land along the East Branch Delaware River, accessed through Harvard Road in the East Branch. The State forest is managed by NYSDEC for multiple uses, including timber production, watershed protection, wildlife habitat, and recreation.
Catskill State Park	Towns of Hancock and Colchester, Delaware County	22, 23, 28, 29	2,619	9.4	The Catskill State Park encompasses approximately 700,000 acres of land in Delaware, Sullivan, Ulster, and Greene Counties, comprising public forest preserve lands, New York City owned watershed lands, and private lands. Forest Preserve lands are protected by Article XIV Section 1 of the New York State Constitution, and comprise approximately 287,500 acres of forest, meadows, wetlands, and lakes within the greater area of the Park. The state-owned portions of the state park (which are referred to as the Catskill Forest Preserve) are used for year-round activities such as camping, hiking, fishing, ski retreats, and wildlife viewing. The Project corridor does not intersect any Catskill Forest Preserve lands.
Wolf Brook Multiple Use Area	Town of Thompson, Sullivan County	55	5,976	46.4	The Wolf Brook Multiple Use Area includes 1.9 miles of trails and unpaved roads and is managed by NYSDEC. This multiple use area is adjacent to the Neversink River Unique Area and includes fishing, hiking, camping, hunting & camping, and wildlife habitat.

Park and Recreational Resources	Town/County	Figure 2-3 Page Number	Crossing Distance (ft)	Acreage within Corridor	Description
Croton Point Park	Town of Cortlandt, Westchester County	110	12,021	11.1	Croton Point Park is a 508-acre park situated on a peninsula on the east shore of the Hudson River controlled by Westchester County Parks. The Park provides year-round events and activities and has facilities for camping, hiking and swimming. The Park includes the Croton Point Nature Center (Westchester County Parks 2022).
Randall's Island Park	New York City (Manhattan), New York County	131	4,787	30.2	Randall's Island Park is a NYC Park that attracts over 4 million visitors to the island each year. Many visitors are local children and families who participate in the Randall's Island Park Alliance free year-round public programming which includes festivals, outdoor movie nights, free yoga classes, garden tours and other activities. Randall's Island Park also includes the Harlem River Event Area, which hosts major concerts, art fairs, and cultural festivals (Randall's Island Park Alliance 2022).

As an additional land use impact minimization measure, the Applicant will implement its Public Involvement Plan (see **Appendix B: Public Involvement Plan** to this Article VII application) throughout construction, including regular updates to the local community through social media, public notices, the Project website, and/or other appropriate communication tools.

4.2.6.1 Agriculture Impacts and Mitigation Measures

As Table 4-2 shows, a total of 93.1 acres of agricultural land is present within the terrestrial transmission line corridor accounting for just 4% of the total land area within the corridor. Most of the agricultural land is pasture/hay (73.8 acres) with cultivated cropland accounting for 19.3 acres. Agricultural production in these areas will be impacted in a narrow and localized area during construction of the Project. The Applicant will implement measures to protect and restore agricultural lands during and after construction in accordance with New York State Department of Agriculture and Markets (NYSAGM) guidelines or landowner/agricultural operator requests to minimize adverse impacts to the extent practicable. As an example, a minimum depth of cover of 48 inches will be provided over the conduit in active agricultural fields. An agricultural inspector will be on-site to ensure compliance with commitments made to NYSAGM and/or landowners during the Article VII process. The Applicant will also work with landowners and NYSAGM regarding compensation for crop loss or damages suffered during construction activities. Agricultural activities will be allowed to resume within the ROW of the underground transmission line after construction. Construction of the transmission line through 15.7 miles of agricultural districts in Delaware, Sullivan, and Orange Counties will not conflict with the management or long-term viability of agricultural lands in those districts.

Construction and operation of the northern converter station in Town of Delhi, Delaware County, will result in the loss of approximately 14 acres of hayfields as it will be contained in the developed and adjacent maintained portion of the station. However, the affected area is not regularly used for hay production or any other agriculture operations.

Based on the above, and in consideration of New York State Public Service Law § 126, the Project avoids or minimizes any significant adverse impact on active farming operations.

4.2.6.2 State and Local Parks/Public Lands Impacts and Mitigation Measures

Potential land use impacts to the seven State and local parks or public lands crossed by the terrestrial transmission line corridor are described in the following section. For all crossings, there will be no long-term aesthetic impacts or impacts to the public's use and enjoyment of these resources. Any impacts during construction, such as noise or temporary restrictions to public access, will be short term. The Applicant will coordinate with the relevant park authority to take precautions to avoid conflicts with any scheduled events and activities during construction and will coordinate construction through public parks during the off-season as practicable.

West Platner Brook Unit

The terrestrial transmission line corridor crosses this New York City Department of Environmental Protection (NYCDEP)-managed land within the existing NYPA and NYSEG transmission line ROWs. No delineated wetlands, streams, or waterbodies are present where the corridor crosses West Platner Brook Unit, and no permanent tree clearing is anticipated in the area. The Applicant will use all appropriate best management practices (BMPs) during construction in accordance with a Project-specific Stormwater Pollution Prevention Plan (SWPPP) such that surface and groundwater quality will not be adversely affected in the area. Furthermore, the Applicant will coordinate with NYCDEP to ensure proper measures

are used to ensure safety of recreational users during construction activities. Operation of the transmission line will not affect NYCDEP's management of West Platner Brook Unit.

East Terry Clove Bagley Brook Unit

The terrestrial transmission line corridor crosses this NYCDEP-managed land within the existing NYPA Marcy South ROW. No delineated streams or waterbodies are present where the corridor crosses East Terry Clove Bagley Brook Unit, and no permanent tree clearing is anticipated in the area. Three delineated emergent wetlands are present with a total crossing distance of approximately 689 ft (210 m). The Applicant will use all appropriate BMPs during construction in accordance with a Project-specific SWPPP and EM&CP such that surface and groundwater quality will not be adversely affected in the area. Furthermore, the Applicant will coordinate with NYCDEP to minimize adverse environmental impacts and to ensure proper measures are used to ensure safety of recreational users during construction activities. Operation of the transmission line will not affect NYCDEP's management of East Terry Clove Bagley Brook Unit.

Tomannex State Forest

The terrestrial transmission line corridor crosses the Tomannex State Forest Haul Road 1, which follows the southern bank of the East Branch of the Delaware River. The haul road is not intended or maintained by NYSDEC for public access. Public access to the Tomannex State Forest is provided from Bump Road, several miles west of the location where the Project corridor intersects the haul road. The Applicant will coordinate with NYSDEC to maintain access during construction, as necessary.

Catskill State Park

The terrestrial transmission line corridor crosses approximately 2,619 ft (798 m) of the Catskill State Park. The entirety of the crossing occurs within the NYSDOT State Route 17 (NY-17) ROW, and no areas designated as forest preserve are crossed. Herbaceous/grassland habitat temporarily disturbed within the NY-17 ROW/park boundary will be fully restored after construction. The Beaver Kill, an approximately 120-ft-wide (37-m-wide) class C(T) stream is crossed within the park boundary. Pending confirmation of viability, the Applicant is planning to cross this stream via HDD such that no direct impacts to the Beaver Kill bed or banks are anticipated.

Wolf Brook Multiple Use Area

The terrestrial transmission line corridor crosses approximately 5,976 ft (1,821 m) of the Wolf Brook Multiple Use Area within the NYPA ROW. No permanent tree clearing is anticipated in this area, and habitat within the corridor is a mix of herbaceous/grassland and shrub/scrub within the existing ROW. The corridor parallels and crosses portions of Wolf Brook Woods Road and Power Line Road, which are multi-use unpaved roads. The Applicant will coordinate with NYSDEC regarding construction timing and other considerations related to construction within the Wolf Brook Multiple Use Area. Measures that the Applicant may use to minimize impacts to users of the recreation area include temporarily rerouting the multi-use roads around areas of active construction and/or installation of temporary barricades and fencing to prevent pedestrians from entering construction work zones.

Croton Point Park

The terrestrial transmission line corridor crosses Croton Point Park for approximately 12,021 ft (3,664 m), a portion of which includes the Croton Point landfall site. The corridor follows a paved road/pathway from the northern end of the park to the landfall site at the southern end of the park near the tip of Croton Point. The landfall site is developed open space (maintained lawn). The Applicant does not anticipate any tree

clearing in the park, and all disturbed areas will be restored following construction. All construction activities will be coordinated with Westchester County to avoid and minimize impacts to park users to the maximum extent practicable.

Randall's Island Park

The terrestrial transmission line corridor crosses Randall's Island Park for approximately 4,787 ft (1,459 m), a portion of which includes the Randall's Island West and Randall's Island East landfall sites. The corridor crosses the northern portion of the park along various roadways and adjacent to several athletic fields. The landfall sites are developed open space (maintained lawn/fields). The Applicant does not anticipate any tree clearing in the park, and all disturbed areas will be restored following construction. All construction activities will be coordinated with NYC Department of Parks & Recreation (NYC Parks) to avoid and minimize impacts to park users to the maximum extent practicable.

4.3 Visual Resources

This section presents an assessment of potential impacts to aesthetic and visual resources resulting from the construction and operation of the Project. A description of the existing visual environment and the visual resources is provided below, followed by an evaluation of potential Project-related visual impacts. More information on visual resources is provided in Appendix C: Visual Resource Assessment to this Exhibit.

4.3.1 Visual Resources Studies and Analysis

The Applicant completed a Visual Resource Assessment for the Project which included the northern converter station, southern converter station, and terrestrial transmission line corridor in accordance with the requirements of 16 NYCRR *§* 86.5.

Three distinct Visual Study Areas (VSAs) were defined for each Project component:

- Northern converter station: Approximately 3-mile radius around the site, due to its location in a primarily undeveloped area.
- Southern converter station: 1-mile radius around the proposed site due to its location in an intensely developed area.
- Terrestrial transmission line corridor: 1,000-ft (305-m) radius around the center of the full length of the corridor, including the landfall locations.

Distinct landscape types were defined within the VSA to provide a useful framework for analyzing the Project's potential visual effects. To characterize the landscape within the VSAs, Landscape Similarity Zones (LSZs) were defined and mapped within the northern and southern converter station VSAs. These VSAs will have permanent, aboveground components that may be visible from various landscapes within their respective VSAs. These LSZs were mapped using a GIS classification exercise based on the 2021® ESRI land use/land cover dataset. LSZs for the converter stations were defined based on the similarity of various landscape characteristics including landform, vegetation, water, and land use patterns, in accordance with established visual methods (notably, USDA Forest Service 1995; Smardon et al. 1988: U.S. Department of Transportation, Federal Highway Administration 2015; and United States Department of the Interior, Bureau of Land Management 1980).

The Applicant identified Visually Sensitive Resources (VSRs) within the VSAs in accordance with guidance provided by NYSDEC Program Policy DEP-00-2 Assessing and Mitigating Visual and Aesthetic Impacts (NYSDEC 2019) as well as resources that could be considered visually sensitive based on the type of intensity of use their receive. Categories of VSRs included:

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

The Applicant conducted a digital surface model (DSM) viewshed analysis to identify areas where the northern and southern converter stations could be visible from ground-level vantage points. A DSM viewshed analysis evaluates potential facility visibility considering the screening effects of topography, structures, and vegetation. The DSM viewshed analyses for the Project were based on LIDAR datasets for both converter stations, sample points for each converter station with heights that represented the tallest structure proposed for each converter station, and an assumed viewer height of 6 ft (1.8 m). The Applicant conducted field review within the VSAs to observe the character of the existing landscape, evaluate potential Project visibility, confirm the results of the viewshed analysis, and photographically document views toward the various Project components.

A viewshed analysis was not conducted for the transmission line VSA because the only action that will result in visual change for that VSA will be the area of permanent vegetative clearing and the associated low visual impact of the clearing. To evaluate potential visual change that could result from permanent vegetation clearing proposed in the transmission line VSA, a 1,000-ft (305-m) Area of Potential Effect (APE) surrounding the permanent vegetation clearing limits was created, and individual APEs were identified. APEs were classified into three clearing types: (1) vegetation clearing in an existing utility line corridor; (2) vegetation clearing in a highway ROW or in a developed area; and (3) vegetation clearing of existing forest, establishing a new cleared transmission line corridor.

Lastly, to show anticipated visual changes associated with the proposed Project, three-dimensional (3D) modeling software was used to create realistic photographic simulations of the proposed Project from eight selected viewpoints: two within the northern converter station VSA, four within the southern converter station VSA, and two within the transmission line VSA.

4.3.2 Existing Visual Resources

Within the northern converter station VSA, four distinct LSZs were identified: forest (72.1% of VSA), rural upland (14.2% of VSA), rural valley (12.9% of VSA), and village (0.7% of VSA). Within the southern converter station, seven distinct LSZs were identified: industrial/community services (38.7% of VSA), medium density residential (9.6% of VSA), high density residential (2.7% of VSA), recreation/open space (8.6% of VSA), open water (39.2% of VSA), commercial (0.4% of VSA), and transportation corridor (0.7% of VSA). See Appendix C: Visual Resource Assessment to this Exhibit for a description of each LSZ and mapping of their locations.

LSZs were not defined for the terrestrial transmission line corridor; rather, land use/landcover types were identified to characterize the landscape associated with the terrestrial transmission corridor VSA. The 2020 ESRI land use/land cover classifications within the terrestrial transmission line corridor VSA are: water (24.3% of VSA), trees (51.4% of VSA), grass (4.9% of VSA), flooded vegetation (>0.1% of VSA), crops (0.9% of VSA), built area (17.4% of VSA), and bare ground (>0.1% of VSA).

A total of 14 VSRs were identified in the northern converter station VSA with half comprising public lands and recreational resources, 15 in the southern converter station VSA with nearly half comprised of public lands and recreational resources, and 162 in the terrestrial transmission line corridor VSA with public lands and recreational resources and high-use public areas comprising more than 80% of the VSRs. See Appendix C: Visual Resource Assessment for a more detailed breakdown and mapping of these resources.

4.3.3 Potential Visual Impacts and Proposed Mitigation

During construction of the Project, temporary increased visibility of construction equipment and construction activity may occur. This may include potential views of materials delivery, excavation/backfill, construction vehicle activity, and construction personnel at road crossings and from open areas directly adjacent to the converter stations and terrestrial transmission line. However, most construction impacts are short-term, mobile, and temporary that will last only for the duration of construction and will not have long-term visual impacts once the Project is built and operational. However, some construction impacts may involve temporary clearing of existing vegetated areas. In this case, much of these areas will be allowed to naturally revegetate, but any areas that are cleared may take a few years to return to a vegetated state, and in the case of forested areas, many years for trees to regrow. In most locations, this clearing will be inconsequential because only a portion of an existing tree stand or forest will be affected, but in locations where this temporary construction clearing is more extensive, a limited number of viewers may be affected.

As indicated above, a viewshed analysis was completed to identify locations within the VSAs where there is potential for the Project to be seen from ground-level vantage points. The results of the viewshed analysis for the northern converter station indicate that some portion of the proposed northern converter station could be visible within approximately 2.2% of its VSA, and that the northern converter station will be screened by vegetation, structures, and/or topography from approximately 97.8% of its VSA. The limited visibility throughout the VSA is generally due to the abundance of forestland on steep hillsides, the presence of woodlots and hedgerows located in valley locations, and the variable topography throughout the VSA. The greatest potential for visibility occurs within the rural valley LSZ due to the concentration of open land near this portion of the Project. Field review confirmed that the results of the viewshed were generally accurate, and the presence of forestland on the steep hillsides surrounding the northern converter station site, as well as woodlots and hedgerows in valley locations, will entirely screen views towards the site from most of its VSA. Visibility would generally be limited to roadway corridors oriented toward or directly adjacent to the northern converter site, portions of cleared agricultural fields within the rural valley and upland LSZs, and the cleared portions of existing transmission line corridors. Where visibility was observed to be possible,

intervening vegetation and topography would limit visibility to the upper portions of the station. For VSRs, a total of 14 were identified within the northern converter station VSA, with 5 (35.7%) of those indicated to have potential visibility of the northern converter station according to the viewshed analysis: two snowmobile trails, a local park/recreation area, and a river and stream with public fishing rights. Lastly, photo simulations indicate that the visual impact of the northern converter station will be variable and largely dependent upon distance from the station, with proximity resulting in moderate visual contrast with existing visual landscape, and at greater distances, minimal to no impact on visual quality or existing character of the views. See Appendix C: Visual Resource Assessment for additional details.

The results of the viewshed analysis for the southern converter station indicate that some portion of the proposed southern converter station could be potentially visible within approximately 43.9% of its VSA, and that the southern converter station will be screened by vegetation, structures, and/or topography from approximately 56.1% of its VSA. The visibility throughout the VSA is generally due to the open, long-distance views available across the open waters of the East River, which is adjacent to the southern converter station site. The greatest potential for visibility occurs within the open water LSZ due primarily to limited visual screening elements in the LSZ and the concentration of open water area in proximity to the southern converter station site. Field review identified areas where the results of the viewshed analysis differed from field observations. The most significant of these was along residential streets in the southern converter station VSA where views toward the converter station site were observed to be less frequent and smaller in area than predicted by the viewshed analysis due to foreground vegetation, structures, and other obstructions. Beyond these areas, visibility predicted by the viewshed analysis was found to be consistent with field review results and confirmed that the greatest concentration of Project visibility will be from the open water LSZ. A total of 15 VSRs were identified within the southern converter station VSA with 10 (66.7%) having potential southern converter station visibility: three sites listed on the NRHP, one heritage area, three local parks/recreation, one interstate, one school, and the city of New York. Lastly, photo simulations indicate that the visual impact of the southern converter station will be variable and largely dependent upon distance from the station, with proximity resulting in moderate visual contrast with existing visual landscape, and at greater distances, minimal to no impact on visual quality or existing character of the views. See **Appendix C: Visual Resource Assessment** of this Exhibit for additional details.

Field review of the cover types identified within the APEs for the terrestrial transmission line indicates that, in areas in which permanent vegetation clearing will occur within an existing utility ROW, the ROWs are only visible at intersections with public vantage points such as roads and rivers. Once a viewer moves as little as 1,000 ft (305 m) from the ROW, the existence of the utility corridor is difficult to discern. Furthermore, clearing within existing ROWs will generally continue to appear as managed ROW, and viewers are unlikely to notice the visual change once low-level vegetation has re-established. Clearing within the highway corridor (e.g., I-84 and State Route 9) will preserve portions of the existing tree stands; while highway users may notice some minimal variation in sightlines, their visual environment will be otherwise unaffected. In areas in which permanent vegetation clearing will occur within an existing forested area or newly created ROW, minimal contrast with the existing landscape and minimal effect on viewers would result. A total of 162 VSRs were identified within the terrestrial transmission line VSA with 28 (17.3%) having area within some portion of the APE: four sites listed on the NRHP; one highway designated or eligible for designation as scenic; one heritage area; one state forest preserve; one other state site; two state forests; two bike routes; one other trail; one local park/recreation; one river with public fishing rights; one named lake; 11 state, US, and interstate highways; and one city.

The Applicant will implement the following measures to address visual impacts associated with the Project:

- Maintenance: The transmission line will be inspected on a regular basis to ensure Project components remain in safe and reliable conditions. Stable, early succession plant communities will

be re-established on the ROW following construction through implementation of a prescribed vegetation management plan.

- Lighting: The proposed converter stations are anticipated to be the only transmission facilities that require lights for security and maintenance. To minimize offsite lighting impacts (glare and skyglow), manually controlled, downwardly directed, full cut-off fixtures will be used at the converter stations.

4.4 Cultural and Historic Resources

This section describes cultural resources within and in proximity to the Project area and assesses the potential for cultural resources to be affected by construction and operation of the Project. This section also describes the Project-specific measures that the Applicant will implement to avoid, minimize, and/or mitigate potential impacts to cultural resources. The term cultural resources, as used here, includes terrestrial archaeological resources (located on land within the terrestrial transmission line corridor), marine archaeological resources (MARs) (located underwater within the submarine transmission line corridor), and above-ground historic architectural resources.

4.4.1 Cultural and Historic Resources Studies and Analysis

4.4.1.1 Terrestrial Archaeological Resources

The Applicant completed a Phase IA archaeological sensitivity assessment of the terrestrial transmission line corridor, consisting of background research and archaeological sensitivity predictive modeling. Ground truthing was completed as part of the Phase IA assessment to refine the modeling. Ground-truthing also assessed the general ground surface conditions, ground disturbance, and potential for past ground-disturbing activities that may preclude archaeological sensitivity. Based on Phase IA assessment findings, the Applicant recommended a Phase IB archaeological survey for certain areas of proposed ground disturbance deemed archaeologically sensitive.

The Phase IA report was submitted to the OPRHP for review in February 2022. In a letter dated February 22, 2022, OPRHP concurred with the report recommendations that a Phase IB archaeological survey was warranted, but it recommended a few adjustments to the proposed testing strategy (see Appendix A: Agency Correspondence to this Exhibit). These adjustments included no Phase IB testing along the portion of the corridor within the I-84 ROW; not eliminating locations of known archaeological sites or standing or demolished historic structures from Phase IB testing owing to slopes greater than 12%; no Phase IB testing or monitoring in paved or roadside portions of the terrestrial corridor in Westchester, Bronx, and Queens; and developing an Unanticipated Discovery Plan to provide to construction personnel prior to commencement of construction activities. These recommendations were incorporated into the proposed Phase IB survey plan and methodology section of the Phase IA report.

Consistent with the recommendations of OPRHP, the Applicant then completed a Phase IB archaeological survey of those areas considered to have terrestrial archaeological sensitivity that may be subjected to disturbance by the proposed Project (e.g., the Project impact area [PIA]).

The PIA, as determined by the predictive model and pedestrian survey, was subjected to subsurface investigations. The objective of the Phase IB survey was to ascertain the presence or absence of archaeological resources in the PIA. The Phase IB survey was completed from April 11 to June 15, 2022, and the survey report was submitted to OPRHP on August 30, 2022. The Applicant will file with the Commission the results of OPRHP's review upon receipt.

The Applicant also prepared an addendum to the Phase IA report to address a route alignment in Westchester County where the route extended beyond the limits of the original study area. The Phase IA addendum specifically addresses the portion of the proposed corridor on Croton Point. The report was submitted to OPRHP for review on August 29, 2022.

4.4.1.2 Marine Archaeological Resources

The Applicant completed a marine archaeology survey in accordance with the Bureau of Ocean and Energy Management (BOEM) Guidelines and SHPO requirements (BOEM 2020; OPRHP 2005). To assess the Project's potential impacts to MARs, the Applicant used a phased approach to identify documented MARs and evaluate the submarine transmission line corridor for its potential to contain undocumented archaeological resources that might be eligible for listing on the NRHP and/or SRHP. The phased approach included the following:

- A literature review and background research to provide environmental, precontact, and historical context for assessing the archaeological sensitivity of the corridor; and
- A full marine archaeological analysis including review and analysis of geophysical survey data.

The marine archaeological analysis included a full assessment of side scan sonar imagery, multibeam echo sounder data, magnetometer data, and sub-bottom profiler data. A remotely operated vehicle was used in some instances to collect additional information on select targets. The marine geophysical survey plans were developed with the assistance of a qualified marine archaeologist who participated in pre-survey meetings, as required. The archaeological information derived from survey data was used to identify archaeological areas of interest (features that may represent cultural resources) and geological features with precontact period archaeological potential. For historic resources, evaluation relied heavily on magnetometer data and side-scan sonar imagery, while precontact resource potential is commonly identified using sub-bottom profiler imagery.

The Applicant is preparing a two-part Phase I marine archaeology survey report to document findings. The Applicant provided notification to OPRHP of the two-part plan approach, and OPRHP responded that Part 1 should be sufficient to facilitate advancement of the Project review (Lloyd 2022). Part 1 of the report included a complete review of the geophysical data and Record of Finds; background data necessary to prepare the archaeological potential assessment specific to submerged precontact archaeology at the landing sites; initial assessment of historical resources (shipwrecks); recommendations for avoidance for all potentially significant wreck sites; and recommendations for mitigation strategies where avoidance is not possible. The Phase I (Part 1) report was submitted to OPRHP on September 23, 2022. Part 2 of the report will include historical context for the Project area and additional background research. The Applicant anticipates submitting Part 2 of the report to OPRHP in October or November 2022 and will file it concurrently with the Commission.

4.4.1.3 Historic Architectural Resources

The assessment of historic architectural properties was limited to the two areas where aboveground facilities will be constructed: the northern converter station in Delhi, Delaware County, and the southern converter station in Astoria, Queens County. The Applicant confirmed with OPRHP that architectural assessment of the buried transmission line is not necessary (WSP 2022a). The Areas of Potential Effect (APEs) for the two locations were developed in consultation with OPRHP in accordance with the *OPRHP/State Historic Preservation Office (SHPO) Guidance on Transmission Lines* (OPRHP 2018). The APEs were based on generated maps of the Project viewshed with regard to proposed structure heights, with a 1-mile radius for the northern converter station, and a 0.5-mile radius for the southern converter station. OPRHP approved

the Applicant's architectural resources study plan on July 25, 2022 (see Appendix A: Agency Correspondence to this Exhibit).

During the Applicant's architectural field reconnaissance of the APEs, land parcels with buildings over 50 years of age based on historic aerial photography were noted, and those that appeared potentially eligible for SRHP and/or NRHP listing were surveyed and documented.

The Architectural Survey reports were submitted to OPRHP on September 28, 2022.

4.4.2 Existing Conditions: Terrestrial Archaeological Resources

The Phase IA Archaeological Sensitivity Assessment, Phase IA Archaeological Sensitivity Assessment for Croton Point, and Phase IB Archaeological Survey Report are provided in Appendix D: Phase IA and IB Terrestrial Archaeological Reports to this Exhibit.

The Phase IA background research identified seven known archaeological sites in the proposed Phase IB PIA; one historic site (Site 02505.000007) in Delaware County; one historic site (Site 10507.000072) in Sullivan County; and five prehistoric sites (Sites 07119.000206, 07119.000008, 07119.000083, 07112.000068, and 07112.000146) in Orange County. The seven sites have an undetermined status for listing in the NRHP. The Project area contains no New York State Museum (NYSM) site points but does contain 16 NYSM site areas. Approximately 36 previous archaeological surveys have been conducted in the Project area.

During the Phase IB survey, field teams completed 2,828 shovel tests (33 unexcavated) and recovered a total of 26 precontact and 95 historic artifacts. The field effort identified 288 surface features, four new sites (one precontact, two historic, and one multi-component), four new isolated finds (two precontact and two historic), and seven previously identified sites or surface features in the Project area. Several of the surface features had been heavily impacted by the existing ROW clearing and disturbance, leaving many of the features destroyed or damaged. However, some locations in the Project area do contain well-preserved examples of fieldstone enclosures and other surface features.

One site, a portion of the Delaware and Hudson (D&H) Canal, was re-identified during the Phase IB survey near Port Orange, Orange County, New York. Part of the canal was made a National Historic Landmark in 1968 and is described as a discontinuous district. Surface features still extant across the width of the current Project area include the canal prism, an eastern berm, a western berm, and a towpath. However, signs of deterioration because of erosion, slope deposition, slumping, and disturbance due to previous ROW clearing and construction are clearly visible. No other evidence of historic surface features or subsurface features related to the canal were observed.

The Phase 1B report recommended that none of the newly identified archaeological sites or surface features are eligible for the NRHP and that no further archaeological fieldwork is required in the PIA in Delaware, Sullivan, and Orange Counties surveyed to date. The Phase 1B report also recommended that additional fieldwork would not further understanding of the portion of the D&H Canal which crosses the corridor. As such, the Applicant is evaluating measures to avoid direct impacts to the D&H Canal, pending OPRHP's review on whether this site is a contributing resource.

As documented in the Phase IA report for Croton Point, the Applicant determined that the entire corridor on Croton Point is highly sensitive for both precontact and historic cultural resources. As such, the Applicant included a Phase IB archaeological survey plan in the Phase IA report, which was submitted to OPRHP on September 1, 2022. The Applicant will complete the Phase IB survey upon review and approval of the survey plan by OPRHP.

4.4.3 Existing Conditions: Marine Archaeological Resources

The Phase I Marine Archaeology Survey Report (Part 1) is provided in Appendix E: Phase I Report Part 1 of 2 - Marine Cultural Resources Assessment to this Exhibit.

MARs consist of precontact archaeological sites once part of the terrestrial landscape and since inundated by global sea level rise during the late Pleistocene and Holocene (BOEM 2022). Precontact MARs include potentially archaeologically sensitive landscapes, now submerged, that would have supported human occupation prior to marine transgression. Glacial regression at the end of the Pleistocene era would have exposed landscapes significantly modified by ice. These landscapes would have consisted of open tundra and grasslands suitable for human occupation, migrations, and subsistence patterns. The archaeological evidence of Paleoindians suggests that human occupation of the New York region began at least 11,300 years ago (Carr and Advasio 2002).

MARs also include historic period sites, such as shipwrecks and associated remains, sunken aircraft, and other maritime infrastructure. These MARs are representative of the maritime history of the Hudson River Valley region since the settlement of European colonists up until the modern era. Examples of historic shipwrecks consist of canal boats, steamboats, barges, ferries, traditional sailing craft, and vernacular craft specifically used along the Hudson, Harlem, and East Rivers. Maritime infrastructure includes shipyards, harbors, wharves, piers, and ferry landings.

A review of databases consulted for background research on the documented prehistoric and historic MARs within 1 mi (1.6 km) of the submarine transmission line corridor identified over 70 prehistoric sites (OPRHP 2021). The temporal eras that these sites represent span from the Archaic Period (10,000 to 2,700 years before present) to the Woodland Period (3,000 to 350 years before present). The prehistoric sites are representative of a variety of types, such as shell middens, lithic workshops, and occupation sites. Some of these sites are eligible for listing in the NRHP because they have yielded, or may be likely to yield, information important in prehistory or history. Other prehistoric sites are undetermined in their eligibility.

MARs associated with the historic era include 22 previously surveyed sites within the submarine corridor. These MARs include shipwreck and maritime infrastructure sites in the East, Harlem, and Hudson Rivers. In the East River, six vessels from the middle nineteenth century to the twentieth century were documented, including four sailboats, one wooden barge, and a modern steel-hulled barge. Within the Harlem River, the remains of a marina facility from the twentieth century were surveyed, with the remains of a wooden pier, mooring piles, a boat launch infrastructure, a concrete platform, and the remains of abandoned boats. Along the Hudson River, the documented MARs consist of maritime infrastructure related to an expansion of Peene's Wharf from the middle of the nineteenth century. The remains of potentially three vessels were also located, one vessel representative of a sailing vessel converted to a barge and the second determined to be part of the first. A nineteenth century sailing vessel was also present.

Also in the Hudson River, archaeological remains of the Tappen-Stole (Piermont) Ferry Landing from the early eighteenth century were noted. Over the course of the middle of the nineteenth century, the ferry landing was augmented to serve as a landing for steamboats and a terminus for the New York and Erie Railroad. Near the Governor Mario M. Cuomo (Mario Cuomo) Bridge, formerly the Tappan Zee Bridge, the remains of one wooden work barge and a coal barge were documented in addition to sediments from a paleo-landform representing a formerly exposed forest and river terrace along with a tidal marsh from the Middle Archaic Period. Near the town of Peekskill, two wrecks of early twentieth century scow type barges were documented as part of a historic wharf and coal conveyor system for the Manufactured Gas Plant and Electric Generating Plant, affiliated with the Consolidated Edison Company of New York, Inc. (Con Edison). A modified vernacular barge potentially representing a barge specifically designed for carrying

brick from the local yards of Peekskill was also found. Other historic maritime-related infrastructure was noted along the Peekskill waterfront in previous archaeological investigations.

The shoreline along West Point has several documented MARs associated with military fortifications. This area is significant due to its association with the American Revolution and the defense of the Hudson River. Building and batteries are denoted along the shoreline such as the chain battery, a water battery, and logistics buildings used by the Continental Army in the late eighteenth century. Additionally, a training battery using two 6-inch disappearing coastal guns added as Battery Schofield between 1907 and 1908 are noted in the West Point area. Contributing surveys of MARs in the northern end of the submarine corridor in the Hudson River indicate the remains of a collection of vessels representative of a late nineteenth century to middle twentieth century wooden tugboat, a wooden barge, and a double-ended ferry from the early twentieth century.

As noted above, the Applicant is preparing a two-part Phase I marine archaeology survey report to document findings of its marine archaeology survey. Part 1 of the Phase I Marine Cultural Resources Assessment Report is provided in Appendix E: Phase I Report Part 1 of 2 - Marine Cultural Resources Assessment to this Exhibit. Part 1 of the Phase I Marine Archaeology Survey Report consisted of the archaeological review of the data collected by the marine geophysical survey. MARs consisting of historical shipwreck sites were identified from review of acoustic imagery and magnetometer data. The potential for precontact MARs was assessed through review of bathymetry, backscatter data review, and subbottom profiles within the context of sea level rise and inferred paleolandscapes.

A total of 235 features were selected from the acoustic imagery and magnetometer data for archaeological review. Of those features, 114 were classified as shipwreck sites, or possible shipwreck sites. The wreck sites assessed to be the result of a wrecking event or abandonment occurring more than 50 years ago were considered to be potentially historically significant and possibly eligible for inclusion into the NRHP. Twenty-six of the wreck sites were classified as not of historic significance based on inferred wrecking dates within the last 50 years and lack of other evidence for possible historic significance. The 88 features with possible historic significance are buffered with avoidance radii of 40 or 60 m (131 to 196 ft) based on discussions for appropriate buffer sizes with OPRHP. Forty-nine of these wreck sites with possible historic significance were previously uncharted, and 74 are located within the APE. Within the submarine corridor, certain geographic areas have higher concentrations of wrecks such as Little Stony Point, West Point, Iona Island, Tappen Zee Bay, and the East River.

A model for the assessment of submerged precontact archaeological potential was generated that yielded approximately 1,186 acres (480 hectares) of riverbed assessed with archaeological potential within the submarine corridor, and 413 acres (167 hectares) assessed with archaeological potential.

4.4.4 Existing Conditions: Historic Architectural Properties

4.4.4.1 Survey Area A: Southern Converter Station (Astoria, Queens County)

No previously identified historic properties are in the architectural APE for the southern converter station. Of the 14 properties in the APE, 4 were previously surveyed and determined not eligible for SRHP and/or NRHP listing. The remaining properties assessed during the August 2022 reconnaissance survey were lacking the necessary significance to warrant consideration for SRHP and/or NRHP listing. Therefore, no historic architectural properties in the southern converter station APE were listed, eligible for listing, or recommended eligible for listing in the SRHP and/or NRHP.

The Architectural Reconnaissance Survey Report for the southern converter station is provided in Appendix F to this Exhibit.

4.4.4.2 Survey Area B: Northern Converter Station (Delhi, Delaware County)

Seven previously identified historic properties are in the architectural APE for the northern converter station (Table 4-4). None of these properties are listed in the SRHP and/or NRHP, but one has been formally determined eligible for SRHP and/or NRHP listing. Five of the remaining properties have an undetermined status, with one property having been previously determined not eligible for listing in the NRHP. The eligible and undetermined properties were surveyed; the one eligible property is recommended to retain that status, one previously undetermined property is recommended eligible, two are recommended not eligible, and two remain undetermined due to their distance from the road and the lack of visibility.

Three additional properties within the APE were surveyed in July 2022 and are recommended eligible for listing in the NRHP. The Architectural Resources Survey Report for the northern converter station is provided in Appendix F to this Exhibit.

Table 4-4. Previously Documented Architectural Resources in the Architectural APE for the Northern Converter Station

USN Number	Property Address	Historic Name	Existing Designation Status
02505.000067	2015 County Highway 16, Delhi, NY	Garrett Farm	Eligible
02505.000066	Middlemist Rd. Over E. Platner Brook	Bridge	Undetermined
02505.000027	1678 County Highway 16, Delhi, NY	Farmstead	Undetermined
02505.000028	1352 County Highway 16, Delhi, NY	Farmstead	Undetermined
02505.000037	1042 County Highway 16, Delhi, NY	Farmstead	Undetermined
02505.000038	627 West Platner Brook Road, Delhi, NY	Dwelling	Undetermined
02505.000030	Gray Road over West Platner Brook	Bridge	Not Eligible

4.4.5 Potential Cultural and Historic Resources Impacts and Proposed Mitigation

4.4.5.1 Terrestrial Archaeological Resources Potential Impacts and Proposed Mitigation

As previously discussed, except for a portion of the D&H Canal, none of the newly identified archaeological sites or surface features within the terrestrial transmission line corridor are recommended to be eligible for the NRHP. The Applicant is evaluating measures to avoid direct impacts to the D&H Canal, pending OPRHP's review on whether this site is a contributing resource. Consequently, no direct impacts to archaeological resources are anticipated within the surveyed portion of the terrestrial corridor.

During consultations and review of the Phase IA report for Croton Point, three Native American Nations expressed substantial concerns with the cultural sensitivity of the proposed route. The Applicant is committed to continuing to consult and work closely with the Nations to minimize the potential for impacts to cultural resources, including careful consideration of the Croton Point alternative routes identified in **Exhibit 3: Alternatives**. If the Applicant identifies any eligible archaeological sites within currently unsurveyed areas, in particular on Croton Point, further assessment of potential impacts and avoidance and mitigation measures will be completed in consultation with OPRHP and Native American Nations.

The Applicant submitted the Phase IB archaeological survey report to OPRHP on August 30, 2022 with a request for concurrence of the survey results and recommended mitigation measures; a response is pending. The Applicant will provide OPRHP's response to the Commission upon receipt.

Ground-disturbing activities have the potential to uncover and impact buried terrestrial archaeological resources; therefore, unanticipated discoveries during construction remain a possibility. The Applicant will develop and implement an Unanticipated Discovery Plan in accordance with NYS and federal laws and as requested by OPRHP. The plan will outline specific protocols to follow if archaeological materials or human remains are discovered during construction activities. The plan will also include contact information for reporting unanticipated discoveries. The Unanticipated Discovery Plan will be included in the EM&CP.

4.4.5.2 Marine Archaeological Resources Potential Impacts and Proposed Mitigation

As previously discussed, 74 shipwreck sites with inferred potential historic significance are located within the submarine corridor. Construction activities have the potential to directly impact these MARs. The Applicant will avoid these sites, including buffers, where possible. Where avoidance is not possible, the Applicant will seek to minimize impacts while also mitigating adverse impacts with site investigations. These site investigations include ground-truthing, additional recording of diagnostic wreck features, and documentation of any changes to the sites resulting from possible impacts.

The Applicant will also seek to avoid ground-disturbing activities in areas assessed to have precontact archaeological potential or identified as an Archaeological Sensitive Area. The Applicant will set aside sediment samples collected during concurrent studies for examination by a qualified archaeologist, if possible. If ground-disturbing construction activities cannot avoid areas assessed with precontact archaeological potential, the Applicant will consider completing an archaeological sampling program of the subsurface sediments in areas where impacts are proposed. The archaeological sampling program depends on the type and extent of the proposed impacts and the stratigraphic context of subsurface sediment data that may be present.

The Applicant submitted Part 1 of the Phase I Marine Cultural Resources Assessment Report to OPRHP on September 23, 2022, with a request for concurrence of the survey results and recommended mitigation measures; a response is pending. The Applicant will provide the OPRHP's response to the Commission upon receipt.

Where disturbance to the riverbed is expected, the Offshore Unanticipated Discovery Plan will be implemented as this type of activity has the potential to uncover and impact MARs. The Applicant will implement the Offshore Unanticipated Discovery plan in accordance with NYS law, federal laws, and as required by the OPRHP. The plan outlines specific protocols to adhere to if any marine archaeological materials or possibly human remains are discovered during construction activities. The plan will also incorporate contact information for reporting unanticipated discoveries. The Offshore Unanticipated Discovery Plan is included in Part 1 of the Phase I Marine Archaeology Survey Report (see Appendix E: Phase I Report Part 1 of 2 - Marine Cultural Resources Assessment to this Exhibit).

4.4.5.3 Historic Architectural Properties Potential Impacts and Proposed Mitigation

Based on the Applicant's architectural resources assessment and as stated in the survey reports for the northern and southern converter stations, no direct or visual impacts to historic architectural properties are anticipated because of the Project. The Applicant submitted the survey reports to OPRHP on September 28, 2022, with a request for concurrence of the survey results; a response is pending. The Applicant will provide OPRHP's response to the Commission upon receipt.

4.5 Topography, Geology, and Soils

This section describes the existing topography, geology, and soils within the Project area. The following information was compiled from public and unpublished data sources, including State and federal agency-published papers and databases; online data portals and mapping databases; and the Applicant's geophysical survey, which is provided in Appendix G: Geophysical Survey Report to this Exhibit. Section 4.5 also addresses potential impacts and mitigation related to topography, geology, and soils.

4.5.1 Existing Topography

The Project crosses four physiographic provinces: the Catskill mountains, the Hudson – Mohawk Lowlands, the Hudson Highlands, and the Manhattan Prong. Topography across these provinces was strongly influenced by glacial advancements and retreats. As the glaciers moved, the varying resistances of different rocks formed the major landscape features. The elevation along the transmission line corridor starts at approximately 2,700 ft (823 m) above mean sea level (amsl) near the Fraser Substation in Delaware County and drops to approximately 10 ft (3 m) amsl at the southern end of the corridor in Queens, New York.

The section of the terrestrial corridor that follows the NYPA Marcy South ROW is primarily in the Catskill mountain province. This physiographic province is a mountainous area with moderate to high relief valleys filled with brooks, creeks, and rivers. The rivers create a narrow and flat floodplain with the highest relief areas usually found on either side. Steep slope areas crossed by the terrestrial corridor occur in this province and are primarily associated with the West Branch Delaware River and East Branch Delaware River crossings, as well as other areas such as near the Beaver Kill and Neversink River.

The terrestrial corridor crosses the Hudson – Mohawk Lowlands primarily along the I-84 ROW. The flat topography of Hudson – Mohawk Lowlands resulted from erosion of softer bedrock produce a flat area where sediments and swamp deposits gather (NYSM-Geological Survey 1989). Along the corridor in this physiographic province, relief is generally low with a few hills west of Middletown. Moderate relief is present just west of I-87 in Newburgh as well as at the Hudson River shoreline.

On the east side of the Hudson River, the terrestrial corridor crosses the Hudson Highlands province in Westchester County and the Manhattan Prong in New York County and Queens. Topography in the Hudson Highlands province resulted from erosion of ancient mountains to produce a series of northeast-trending topographic highs separated by narrow valleys and the Hudson River. Glacial advances in the more recent geologic past have also influenced area topography and resulted in formation of long, linear cliff faces, glacial polish marks, and low-lying swamps and marshy areas (Johnson and Gellasch 2004). Mountain-building and uplift, erosion, and glaciation of the past resulted in development of an undulating topography. The terrestrial corridor through this province has low relief.

Topographic relief in the Manhattan Prong is characterized as flat, and slopes are minimal. The terrestrial corridor in the Manhattan Prong is heavily urbanized and composed of filled land, and any previously existing topographic grades have been leveled for the construction of structures and urban land.

The northern converter station is on top of a small ridge with low relief between two valleys while the southern converter station is in an urban area that is flat. The Newburgh-Beacon Bridge, Charles Point, and Croton Point landfalls have low relief with gentle slopes leading into the Hudson River. Randall's Island east and west landfalls, as well as Lawrence Point landfall, are urbanized and flat.

Bathymetric conditions along the submarine transmission line corridor are discussed in Section 4.8.2.

4.5.2 Existing Geology

4.5.2.1 Terrestrial Components

The mountains and valleys along the Project corridor are composed of Precambrian-aged igneous and metamorphic basement rocks that were uplifted during a series of orogenies (mountain-building events) that took place during Paleozoic and Mesozoic time (541 through 66 million years ago). During the last continental glaciation, occurring from approximately 20,000 years to 12,000 years ago, glaciers modified the regional topography by smoothing off hilltops, scouring out some valleys and filling in others, then leaving a mantle of unconsolidated material over the land surface. Within the terrestrial corridor, the bedrock in the Catskills are Silurian and Devonian aged sandstone, shale, and limestone. The surface geology is mostly till (varying clay, silts, and sands from glacial deposits) ranging from 3 to 150 ft (0.9 to 46 m) in thickness or exposed bedrock. In the valleys there are fluvial deposits of sand and gravel with thickness of 6 to 60 ft (1.8 to 180 m) as well as floodplain deposits of silt, sand, and gravel with thickness from 3 to 30 ft (0.9 to 9 m) (NYSM-Geological Survey 1987). The Hudson Mohawk – Lowlands bedrock consists of Ordovician shale, sandstone, and limestone. The surficial geology is primarily till with thickness ranging from 3 to 150 ft (0.9 to 46 m) Kame deposits (calcareous cemented fine-grained sand and gravel) ranging from 30 to 90 ft (9 to 27 m) thick, calcareous silt and clay lake deposits up to 300 ft (91 m) thick, and fluvial deposits of sand and gravel ranging from 6 to 60 ft (1.8 to 180 m) thick.

Bedrock outcrops and bedrock stipple overprint (shallow bedrock 3 to 9 ft [0.9 to 2.7 m] deep overlain with till where bedrock may sporadically crop out) occur within the terrestrial corridor. Two stretches of bedrock stipple overprint spanning over 1 mile are present: the first spans approximately 15 miles from the Beaver Kill and progressing southeast along the terrestrial corridor; the second is about 3 miles long located south of Westbrookville and northwest of State Route 211. Other scattered areas of bedrock stipple overprint occur at the top of the valleys traversed by the Project corridor. Within these areas of bedrock over stipple the Applicant identified seven areas of rock outcrops ranging from 175 to 300 ft (53 to 91 m) long.

As Table 4-5 shows, eight active mines are located within 1 mile of the terrestrial transmission line corridor. The corridor does not cross any active mines; the closest mine, a sand and gravel operation, is located approximately 10 ft (3 m) from the corridor. The location of these mines is shown on Figures 2-2 and 2-3 in **Exhibit 2: Location of Facilities**.

Geology at the converter stations and landfall sites is mostly common glacial deposits. Data from NYSM-geological survey and web soil survey (SSURGO soils data) were used to determine the following geology and depths to bedrock, respectively. The northern converter station is entirely till with 40% of the area having bedrock depth at around 2.3 ft (0.7 m) and 60% at a depth greater than 6 ft (1.8 m). The southern converter station is also till with bedrock at a depth greater than 6 ft (1.8 m). The Newburgh-Beacon bridge landfall is also all till with a bedrock depth greater than 6 ft (1.8 m). At the Charles Point landfall, there is till along the shoreline and kame deposits slightly inland. Depth to bedrock is split 50-50% between about 4 ft (1.2 m) and greater than 6 ft (1.8 m) deep. The Croton Point landfall is mostly kame deposits, but the geology of the land heading out towards the Hudson River are lacustrine silt and clay deposits (laminated silt and clay, generally calcareous and usually deposited in proglacial lakes). Depth to bedrock at Croton point landfall is greater than 6 ft (1.8 m). Randall's Island, both east and west landfalls, is made with artificial fill and has a depth to bedrock greater than 6 ft (1.8 m). The Lawrence Point landfall is till with a bedrock depth greater than 6 ft (1.8 m).

4.5.2.2 Submarine Components

The Applicant conducted a geophysical survey of the submarine corridor (see Appendix G: Geophysical Survey Report to this Exhibit) split into four sections, and the findings were summarized for each. The first section is between Newburgh and Cornwall-on-Hudson, New York, in the Hudson River and is predominantly flat with fine sand and silt sediments separated by steep areas of rock outcrop and boulders. Bedrock and shallow boulder fields were observed just below the sediment. Bedrock in this section of the submarine corridor includes granite, gneiss, amphibolite, quartzite, marble, and norite. The second section of the survey of the Hudson River is between Croton-on-Hudson and the western mouth of the Harlem River. The riverbed is made of sediment sand waves, with some boulders and occasional bedrock outcrops. The bedrock geology includes: shist, gneiss, marble, amphibolite, quartzite, and granulite. On the western bank of the Hudson River are the Palisades Cliffs, which are a sequence of diabase sitting atop sandstone and shale over schist. The Harlem River, from its confluence with the Hudson to Randall's Island, is the third section and has a mixed bottom of sediment and emergent boulders/bedrock. The bedrock is the Manhattan formation, Fordham Gneiss, and Inwood Marble. The fourth and last section is in the East River, and extends from Randall's Island to the Lawrence Point landfall location. The Applicant's geophysical survey indicates emergent rock (exposed bedrock) is present in this area, attributed to the high currents and minimal sediment deposition (see Appendix G to this Exhibit).

4.5.2.3 Seismic Activity

Data published by USGS indicate that no Quaternary faults (faults with surface expression that have been determined to have moved in the last 2.6 million years) are found near the terrestrial or submarine corridors (USGS 2021a). The 2018 USGS National Seismic Hazard Model demonstrates peak ground accelerations as percent "g" within a 2% probability of exceedance in 50 years for the conterminous United States. Along the terrestrial corridor through Delaware and Sullivan Counties, the seismic hazard ranges from 0.07 to 0.09. The seismic hazard ranges from 0.09 to 0.18 along the remainder of the terrestrial corridor and along the entire submarine corridor, increasing with southward progress. These values generally correspond to low hazard. The rating is based on a scale of 0 through 1.60+, where zero indicates the lowest hazard and 1.60+ indicates the highest hazard (USGS 2018).

The USGS Earthquake Catalog was used to assess earthquake activity in the corridor since 1900 (USGS 2021b). Results of this search revealed 134 earthquakes, all minor, in the vicinity of the corridor. The greatest of these was a magnitude 3.6 event that occurred in 1985, approximately 10 miles east of the Hudson River at the southern end of the transmission line corridor.

4.5.3 Existing Soils

A soil map unit represents an area dominated by one or more major kinds of soil or miscellaneous areas. It is identified according to the taxonomic classification of the dominant soils. Map units are made up of the soils for which they are named and some minor soils that belong to taxonomic classes other than those of the major soils. Most minor soils have properties similar to those of the dominant soil or soils in the map unit. Soils that have profiles that are almost alike make up a soil series (USDA-NRCS 2021). Within the terrestrial transmission line corridor, 43 soil map units comprise 30 soil series. Characteristics of some of the most commonly found soil series within the terrestrial transmission line corridor are summarized in Attachment 3. Soil map units at the landfall and converter station sites are summarized in Table 4-6.

Table 4-5. Active Mining Operations within 1 Mile of the Terrestrial Transmission Line Corridor

Mine ID	Permittee	Mine Name	Location/Address	County	Town	Commodity	Distance in Feet from Proposed Corridor	Direction from Proposed Corridor
30497	Woodbourne Lawn And Garden Inc.	Mongaup Valley Pit	Kortright Rd.	Sullivan	Bethel	Sand and Gravel	10	East
30039	Mongaup Valley Sand & Gravel Inc.	Mongaup Valley Sand & Gravel	East side of Gale Rd. ~ 1.3 miles north of NY-17B	Sullivan	Bethel	Sand and Gravel	2,193	West
30097	E Tetz & Sons Inc.	Mongaup Valley Quarry	South side of NY-17B 3.75 miles west of intersection with NY-17 (the “Quickway")	Sullivan	Thompson	Sandstone	3,439	West
30005	Callanan Industries Inc	Bridgeville	Sullivan Rd. South of NY-17	Sullivan	Thompson	Sandstone	1,100	North
40962	Sonny & Sons Stone Company LLC	Downsville Quarry	Off Barney Hollow Rd., west side of NYS Route 30, Downsville	Delaware	Colchester	Bluestone	401	Southwest
40875	J & A Sand & Gravel Inc.	Antunes Mine	East and north of intersection Shinhopple Brook Rd. and State Highway 30	Delaware	Colchester	Sand and Gravel	3,040	South
40477	Colchester, Town of	Colchester Gravel Bank	PO Box 321, Downsville, NY, 13755 0031	Delaware	Hancock	Sand and Gravel	1,417	North
40603	Banker, Arnold L	Banker Gravel Bank	485 Banker Rd, Downsville, NY, 13755 0000	Delaware	Colchester	Sand and Gravel	3,151	West

Table 4-6. Soils Mapped at the Landfall and Converter Station Sites

Location	Map Unit and % of area
Northern Converter Station	• Halcott, Mongaup, and Vly soils, 12% • Lackawanna flaggy silt loam, 46% • Morris flaggy silt loam, 6%, Farmland of statewide importance • Oquaga channery silt loam, 34%, Farmland of statewide importance
Southern Converter Station	• Urban land, 100%
Newburgh-Beacon Bridge Landfall	• Mardin gravelly silt loam, 58%, Farmland of statewide importance • Collamer silt loam, 8 to 15% slopes, 13%, farmland of statewide importance • Collamer silt loam, 15 to 25% slopes, 29%
Charles Point Landfall	• Udorthents, smoothed, 32% • Urban land-Charlton-Chatfield complex, 68%
Croton Point Landfall	• Riverhead loam, 9% • Knickerbocker fine sandy loam, 91%, Farmland of statewide importance
Randall's Island West Landfall	• Laguardia-Urban land complex, 100%
Randall's Island East Landfall	• Laguardia-Urban land complex, 100%
Lawrence Point Landfall	• Urban land, 100%

The updated USDA-NRCS Soil Survey Handbook No. 18 defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses" (USDA-NRCS 2017). It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands "have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are also permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding." According to the SSURGO database, 6.9% (201 acres) of the terrestrial corridor is mapped as prime farmland. A small portion (0.7 acres) of the northern converter station site is mapped as prime farmland (USDA-NRCS 2021).

The Soil Survey Handbook defines farmland of statewide importance as "those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable." According to the SSURGO database, 25.8% (743 acres) of soils within the terrestrial corridor and 21% (11 acres) of soils within the northern converter station site are considered farmland of statewide importance (USDA-NRCS 2021).

Riverbed characteristics along the submarine transmission line corridor are discussed in Section 4.8.2.

4.5.4 Potential Topography, Geology, and Soils Impacts and Mitigation

4.5.4.1 Construction

Topography

Construction of the terrestrial transmission line will involve conventional trenching operations as well as excavations for trenchless crossings and splice pit/vault installations. All excavated areas will be restored to pre-construction grades as will most of the areas along the transmission trench line. Based on preliminary engineering design, permanent grading will be required along approximately 0.8 miles of the terrestrial transmission line corridor where it crosses rock outcrops.

Temporary environmental erosion controls (e.g., swales, erosion control socks, straw bale and/or silt fence barriers and the protection of soil stockpiles) will be installed to stabilize areas where moderate slopes are encountered in accordance with BMPs as outlined in the SWPPP to be prepared for the Project as part of the EM&CP. In areas requiring grading and the excavation of previously disturbed soils, existing drainage patterns will be maintained to the extent practicable.

Construction of the two converter stations will include general site preparation and minimal grading. Grading will ensure adequate drainage and consider the potential effects of erosion, high winds, and ice. Temporary environmental erosion controls will be installed in accordance with BMPs as outlined in the SWPPP to be prepared as part of the Project EM&CP. These controls will be maintained until the sites are restored and stabilized.

Geology

Impacts to geology during construction activities will include short-term disturbances of the upper layers of ground along the terrestrial corridor. Based on evaluation of desktop data, depth to bedrock is greater than 6 ft (1.8 m) along the majority of the terrestrial transmission line corridor (91.1% of mapped soil areas), sufficient to accommodate Project construction. Bedrock is primarily sedimentary rocks such as limestone, dolostone, and sandstone, which typically may be mechanically excavated and would not likely require blasting, or similar means and methods of removal. Some bedrock is metamorphic rock and may be difficult to mechanically excavate, therefore requiring blasting. Because blasting would only be used if other techniques, such as augering or ripping, are not practicable, widespread blasting is not anticipated based on currently available data. The Applicant is in the process of performing geotechnical surveys throughout the terrestrial route. Additional details regarding the specific locations of blasting, if any, and any related BMPs will be included in the EM&CP.

Construction of the submarine transmission line will result in temporary riverbed disturbance and sediment suspension and deposition. Impacts to geologic resources during construction of the submarine transmission line will be limited to the mechanical cutter, mechanical plow, and/or jet plowing of the riverbed during cable installation. While localized, temporary impacts to deposits, consisting of silt and fine to coarse sand, are anticipated from the submarine cable installation, measurable impacts to geologic resources from the submarine transmission line installation will be negligible for the overall geologic resources and processes in the area. At landfall locations, HDD techniques will avoid impacts to surficial sediments. The temporary exit pits installed nearshore for the HDD installations will result in short-term and localized impacts to sediments, but no permanent or long-term impact to geologic resources are expected.

Sediment suspension and deposition from excavation of the HDD exit pits in nearshore waters are predicted to occur within a very small radius of the activity. Any localized impacts to marine deposits will be short-term and temporary. For geological conditions, impacts from leveling of sand waves and movement of

boulders will be limited, because the overall stratigraphy of the geologic deposits will not be significantly altered.

In summary, construction effects on surficial geology will be minor, and no perceptible changes in the overall regional geological conditions will be noticed.

Soils

Soils will be temporarily disturbed in the terrestrial transmission line corridor from trenching and excavation activities associated with installation of the transmission line duct banks and cable splice pits/vaults. Impacts to soils from erosion and runoff during construction in low relief areas are expected to be short-term, minor, and localized, as those areas are generally flat and not easily eroded. In high relief areas, targeted BMPs will be implemented in accordance with the NYS Standards and Specifications for Erosion and Sediment Control. Following installation of Project infrastructure, areas temporarily disturbed will be backfilled, stabilized, and restored to pre-construction conditions to the extent practicable. Excavated soils will be examined to determine their suitability for reuse, including landowner coordination; soils not reused will be disposed appropriately.

All onsite construction activities will be conducted in compliance with the State Pollutant Discharge Elimination System (SPDES) General and/or Individual Permit(s) for Stormwater Discharges from Construction Activity and the SWPPP prepared as part of the Project EM&CP. Furthermore, the Applicant will consult with the NYSAGM regarding use of appropriate BMPs during construction in areas underlain by soils designated as prime farmland and farmland of statewide importance where such areas are in active agricultural use.

At this time, Project design includes the preliminary locations of construction access roads; however, final access road design is not complete. The Applicant plans to use existing access roads to the maximum extent possible which will limit impacts to soils. Additional details will be provided in the EM&CP.

Permanent disturbance will be limited to the addition of approximately 10 acres of impervious surface for the northern converter station (the southern converter station will be constructed on developed land). Post-construction stormwater management practices will be developed as part of the EM&CP/SWPPP.

4.5.4.2 Operation

Potential operational impacts associated with the Project with respect to topography, geology, and soils are expected to be temporary and highly localized. The terrestrial transmission cables will primarily be monitored remotely, but may require periodic testing, with readings taken from access chambers, and should not require maintenance except in the case of a fault or damage caused by a third party or unanticipated event. Any short-term impacts resulting from cable repairs would be less than the disturbances associated with the construction phase and generally confined to previously disturbed locations. If excavation is required for repairs during operations, impacts would be further minimized through erosion and sediment controls. Likewise, if mechanical damage to the submarine transmission line should occur, repair of the cables may result in disturbance to the riverbed from maintenance vessels and activities and sediment suspension and deposition causing localized, temporary impacts.

4.6 Terrestrial Vegetation and Wildlife

This section addresses the requirements of 16 NYCRR § 86.5 relative to impacts to terrestrial plant life and wildlife, protection of natural vegetation, protection of adjacent resources, and the use of pesticides. This section describes the terrestrial vegetation and wildlife resources that are known to occur or have the

potential to occur in the vicinity of the terrestrial transmission line, landfalls, and converter station sites. Potential impacts to terrestrial vegetation and wildlife resources associated with construction and operation of these Project components are then discussed. Finally, this section describes the Project-specific measures that the Applicant will implement to avoid, minimize, and/or mitigate potential impacts to terrestrial vegetation and wildlife. Protected species and important habitats are discussed in detail in Section 4.10.

4.6.1 Terrestrial Vegetation and Wildlife Studies and Analysis

To determine the baseline terrestrial vegetation and wildlife conditions, the Applicant conducted a desktop review of the proposed terrestrial transmission corridor, landfall locations, and converter stations, using the following resources:

- 2019 NLCD: Land Cover Conterminous United States (Dewitz 2021);
- Publicly available aerial imagery including ESRI base layers, WMS, NAIP, and Google Earth Historical Aerial Imagery;
- NYSDEC Division of Fish and Wildlife, NYNHP (Conrad 2021); and
- USFWS Information for Planning and Consultation (IPaC) (USFWS 2021).

Additionally, a field reconnaissance of terrestrial vegetation and wildlife was conducted concurrently with wetland delineations in the fall of 2021 and spring of 2022. Wetland delineators recorded observations of vegetative cover types and wildlife during field surveys.

4.6.2 Existing Terrestrial Vegetation

A summary of the NLCD cover types within the terrestrial transmission line corridor is provided in Section 4.2 in Table 4-1. Most of the corridor is located within areas currently under some version of an Integrated Vegetation Management (IVM) program, which use multiple control methods including cultural, mowing and other mechanical controls as well as targeted herbicide use to accomplish the objective needed. The NYPA Marcy South ROW is managed by an IVM plan referred to as the NYPA Systemwide Long-Range Transmission Right-of-Way Vegetation Management Plan. The NYPA IVM plan is employed to ensure that tall growing trees and woody shrubs do not interfere with NYPA's electric power transmission facilities (NYPA 2022). The I-84 and State Route 9 ROWs are managed by the NYSDOT IVM program called the Statewide Roadside Vegetation Management plan. This NYSDOT IVM program is implemented to provide motorists with adequate site distances and visibility of signs and guiderails; prevent the growth of large trees that can become hazardous fixed objects, potentially impacting the ability of an errant vehicle to safely stop and/or to reasonably safely reenter the highway; eliminate vegetative growth in pavement crevices that can result in further pavement deterioration and drainage problems; control and prevent spread of invasive and/or noxious species; and foster habitat for pollinators and other wildlife in appropriate locations (NYSDOT 2021). Vegetation communities present in the terrestrial transmission corridor corresponding to the NLCD classes are summarized below.

4.6.2.1 Grassland/Herbaceous/Vines

This community is defined as areas dominated by graminoid or herbaceous vegetation, generally more than 80% of total vegetation. These areas are not subject to intensive management such as tilling but can be used for grazing. The grassland/herbaceous cover type covers approximately 17.9% of the terrestrial transmission line corridor. Most of this cover type occurs within the portion of the corridor within the I-84 median. Representative common herbaceous vegetation observed in this area includes Canada Goldenrod (*Solidago canadensis*), Kentucky bluegrass (*Poa pratensis*), Rough-stemmed goldenrod (*Solidago rugosa*),

Orchard grass (*Dactylis glomerata*) Flat-top goldenrod (*Euthamia graminifolia),* Hedge bed-straw *(Galium mollugo),* Late golden-rod *(Solidago altissima),* Common yarrow (*Achillea millefolium*), Giant Goldenrod (*Solidago gigantea*x), and Broadleaf plantain (*Plantago major*). This vegetation type is also present in scattered patches in the portions of the corridor within the NYPA Marcy South ROW, within Croton Point Park, and on Randall's Island.

4.6.2.2 Scrub/Shrub

This community is defined as areas dominated by shrubs less than 16 ft (5 m) tall with shrub canopy typically more than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions. The scrub/shrub community is the dominant cover type within the terrestrial transmission line corridor, covering 47% of the corridor. Most of the corridor within the NYPA Marcy South ROW comprises scrub/shrub vegetation. Common shrubs in this area include Common Blackberry (*Rubus allegheniensis*), Swamp dewberry *Rubus hispidus*), Morrow's honeysuckle (*Lonicera morrowii*), Multi-flora rose (*Rosa multiflora*), High-bush blueberry (*Vaccinium corymbosum*), Red raspberry (*Rubus idaeus*), White meadowsweet (*Spiraea alba*), Alder Buckthorn (*Frangula alnus*), and Arrowwood viburnum (*Viburnum dentatum*). This cover type is also present in small portions of the corridor within the I-84 and State Route 9 ROWs.

4.6.2.3 Deciduous Forest

This community is defined as areas dominated by trees generally more than 16 ft (5 m) tall and more than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change. The deciduous forest cover type covers approximately 6% of the terrestrial transmission line corridor. Most of this cover type occurs along the portion of the corridor within the US Route 9 ROW where it occupies linear strips along the edges of the NYSDOT ROW. Other occurrences are along the portion of the corridor within the NYPA Marcy South ROW in uncleared deep valleys and in the vicinity of the Charles Point landfall site. Common deciduous forest species observed in the corridor include American Beech (*Fagus grandifolia*), Alder Buckthorn (*Frangula alnus*), Arrowwood viburnum (*Viburnum dentatum*), Eastern White Pine *(Pinus strobus*), Common Buckthorn (*Rhamnus cathartica*), Sugar-maple (*Acer saccharum*), Red maple (*Acer rubrum*), White oak (*Quercus alba*), Red oak (*Quercus rubra*), and American basswood (*Tilia americana*).

4.6.2.4 Evergreen Forest

This community is defined as areas dominated by trees generally greater than 16 ft (5 m) tall and more than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage. The evergreen forest cover type covers less than 1% of the proposed terrestrial transmission line corridor. Representative common evergreen forest species in this area include primarily Eastern white pine and Eastern hemlock (*Tsuga canadensis*) along with occasional examples of Scots pine (*Pinus sylvestris*), and/or Norway spruce (*Pinus resinosa*).

4.6.2.5 Mixed Forest

This community is defined as areas dominated by trees generally more than 16 ft (5 m) tall and more than 20% of total vegetation cover. Neither deciduous nor evergreen species is greater than 75% of total tree cover. The mixed forest cover type covers approximately 4% of the proposed terrestrial corridor. Most of this cover type occurs along the two deviations from the NYPA ROW at the Beaver Kill and Neversink River crossings. Common mixed forest tree species observed in the corridor included eastern hemlock, white pine, sugar maple, red and white oak, and Eastern cottonwood (*Populus deltoides*).

4.6.2.6 Woody Wetlands

This community is defined as areas where forest or shrubland vegetation accounts for more than 20% of vegetative cover, and the soil or substrate is periodically saturated with or covered with water. Woody wetlands cover about 4% of the terrestrial transmission line corridor, most of which occurs in the portion of the corridor within the NYPA ROW with lesser amounts in the I-84 ROW. Common woody wetland species observed in the corridor included white meadowsweet, highbush blueberry, alder buckthorn, silky dogwood (*Cornus amomum*), red maple, Green ash (*Fraxinus pennsylvanica*), Speckled alder (*Alnus incana*), white ash, Bebb's willow (*Salix bebbiana*), and American pussy willow (*Salix discolor*).

4.6.2.7 Emergent Herbaceous Wetlands

This community is defined as areas where perennial herbaceous vegetation accounts for more than 80% of vegetative cover, and the soil or substrate is periodically saturated with or covered with water. The emergent herbaceous wetlands cover type covers about 6% of the terrestrial transmission line corridor, most of which occurs in the portion of the corridor within the NYPA ROW with lesser amounts in the I-84 ROW. Common emergent herbaceous wetland species in the corridor include soft-stem bulrush (J*uncus effusus*), Woolgrass (*Scirpus cyperinus*), Rough-stemmed goldenrod, Sensitive fern (*Onoclea sensibilis*), giant goldenrod, Reed-canary grass (*Phalaris arundinacea*), Shallow sedge (*Carex lurid*a), (Fox sedge (*Carex vulpinoidea*), and Purple loosestrife (*Lythrum salicaria*), flat-top goldenrod, and Common reed (*Phragmites australis*).

4.6.2.8 Barren Land (Rock/Sand/Clay)

This community is defined as areas of bedrock, desert, pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover. The barren land cover type covers less than 1% of the terrestrial transmission line corridor and typically includes species like rock polypody or rock cap fern (*Polypodium virginianum*), marginal wood fern (*Dryopteris marginalis*), common hairgrass (*Avenella flexuosa*), mountain laurel (*Kalmia latifolia*), and eastern hemlock. Occurrences are primarily limited to rocky outcrops along the portion of the corridor in the NYPA ROW.

4.6.3 Existing Terrestrial Wildlife

4.6.3.1 Birds

The New York Breeding Bird Atlas (BBA) is a statewide inventory of all the birds breeding in the state. The first Atlas was conducted from 1980-1985, the second from 2000-2005 (McGowan and Corwin 2008), and NYSDEC is currently working with agency and conservation partners to conduct the third atlas from 2020-2024. Field work is conducted by dividing the state into small blocks (approximately 9 square miles within which volunteers record all the bird species using that area and document evidence of breeding (NYSDEC 2022a).

The northern end of the terrestrial transmission line corridor within the NYPA ROW to the I-84 ROW contains a mixture of mostly managed habitats most conducive to bird species which are better adapted to anthropogenically influenced habitats. Successional habitats that occur within this portion of the corridor may also support those species adapted to scrub-shrub and forest edge habitats. Short stretches of woodlands crossing this segment of the corridor may support species better adapted to interiors; however, given their proximity to disturbed ROW areas, it is less likely that deep-woods birds would be utilizing these areas.

According to the BBA second Atlas, at least 77 species of birds are identified as utilizing the blocks within the northern end of the terrestrial transmission line corridor. It should be noted that the corridor only occupies a small percentage of the blocks. Habitat may be present within the nine-square mile blocks that is not present within the corridor. Species identified by the BBA in this area that are likely to occur within the corridor include, but are not limited to, American crow, brown creeper, Canada goose, indigo bunting, northern cardinal, yellow warbler, Baltimore oriole, eastern bluebird, great horned owl, pileated woodpecker, and wild turkey.

The section of the corridor within the I-84 ROW features a vegetated median strip that likely supports bird species adapted for paved highway habitats. Opportunistic birds of prey, such as red-tailed hawks and turkey vultures, are likely to occur within this area. Certain grassland species may also be found occasionally in this area. Transient woodland bird species may utilize the I-84 median as flyover habitat. According to the BBA second Atlas, at least 76 species of birds are identified as utilizing the blocks within this section of the corridor. Representative bird species include mourning dove, red-bellied woodpecker, downy woodpecker, and northern mockingbird.

According to the BBA second Atlas, at least 89 species of birds are identified as utilizing the blocks within the section of the terrestrial transmission line corridor east of the Hudson River in Westchester County. Similar bird species as those mentioned above in the northern end of the corridor along the NYPA ROW would likely be present in this area. In addition, as this portion of the corridor is near the shoreline of the Hudson River, the likelihood of water-adapted birds increases. These species include great egret, great blue heron, mallard, mute swan, and belted kingfisher.

The transmission line corridor on Randall's Island and within Queens crosses heavily developed areas. As such, only those birds adapted to densely urbanized environments will likely be found within this section of the corridor. Species expected within this area include rock pigeon, chimney swift, house wren and house sparrow.

4.6.3.2 Mammals

New York is home to over 80 species of native mammals ranging in size from shrews and bats to bears and moose (New York State Conservationist 2003). Common woodland mammals and those species best adapted to human-influenced communities would be the most likely to occur within the terrestrial transmission line corridor. In the northern end of the corridor within the NYPA ROW, many woodland species are likely present but in a transient manner as they pass between appropriate habitats on either side of the ROW. Mammals likely to be present in this area include game species such as white-tailed deer, black bear, eastern cottontail rabbit, snowshoe hare, and gray squirrel. Furbearers such as bobcat, long-tailed weasel, opossum, striped skunk, raccoon, red fox, gray fox, coyote, porcupine, and fisher are likely present as well. Along the streams and rivers in this section of the corridor, species like mink, muskrat, and river otter are likely present. Several beaver dams were observed in the corridor during field surveys. Non-game mammals likely include small mammals such as shrews, moles, voles, mice, flying squirrels, red squirrel, eastern chipmunk, and bat species.

Within the segment of the corridor with the I-84 ROW, it is unlikely that any large mammals such as white-tailed deer or black bears would be residents, although white-tailed deer often cross the highway. Within the small patches of woodlands present in the I-84 median, the same small game animals, furbearers, and small mammals present noted above will likely also be present as resident or transient individuals. Within the mowed/maintained portion of the I-84 ROW, only the burrowing small mammals would likely be residents. Bats may forage over these areas as well, but likely roost off the highway corridor.

The section of the corridor east of the Hudson River in Westchester County is likely to contain similar mammal species as those mentioned above in the northern end of the corridor along the NYPA ROW.

Mammals present within the corridor on Randall's Island are likely to include game species such as small game species such as eastern cottontail rabbit and gray squirrel, furbearers such as opossum, striped skunk, and raccoon. Most of the small mammals noted above, including various bat species, would likely be present as well, with the addition of the Norway rat. Mammal species within the corridor through Queens are limited due to the developed landscape.

4.6.3.3 Reptiles and Amphibians

The Amphibian & Reptile Atlas Project (Herp Atlas) was a 10-year survey (1990-1999) that was designed to document the geographic distribution of New York State's herpetofauna. There are about 70 species of amphibians and reptiles in New York State. They occur in a wide variety of habitats from the Adirondack Mountains to the Finger Lakes to Long Island's ocean waters, as well as in the cities and suburbs in between (NYSDEC 2022f).

Reptiles and amphibians observed in the terrestrial transmission line corridor during field surveys included green frog, American bullfrog, northern water snake, common garter snake, ribbon snake, spotted turtle – a NYS special concern species, painted turtle, snapping turtle, eastern newt, and spotted salamander egg masses. Other herpetofauna likely to be present in various segments of the corridor include northern redback salamander, eastern American toad, green frog, and northern redbelly snake.

4.6.4 Existing Invasive Species

The presence of terrestrial invasive species is common along transmission line ROWs and other utility and transportation corridors. Terrestrial invasive species include both plants and animals. NYSDEC currently lists 71 plant species as prohibited and six plant species as regulated invasive species (6 NYCRR Part 575). Additionally, 13 terrestrial invertebrates are listed as prohibited invasive species and five terrestrial vertebrates are listed as prohibited and six vertebrate species as regulated invasive species. The following invasive plant species were documented within the terrestrial transmission line corridor during field surveys conducted in the fall of 2021 and spring of 2022: garlic mustard (*Alliaria petiolata*), mugwort (*Artemisia vulgaris*), Japanese barberry (*Berberis thunbergii*), oriental bittersweet (*Celastrus orbiculatus*), autumn olive (*Elaeagnus umbellata*), smooth buckthorn (*Frangula alnus*), Morrow's honeysuckle (*Lonicera morrowii*), Tartarian honeysuckle (*Lonicera tartarica*), purple loosestrife (*Lythrum salicaria*), Japanese stilt grass (*Microstegium vimineum*), common reed grass (*Phargmites australis*), common buckthorn (*Rhamnus cathartica*), multiflora rose (*Rosa multiflora*), and Wineberry (*Rubus phoenicolasius*). Additionally, evidence of emerald ash borer (*Agrilus planipennis*) was observed. Most of the invasive plant species present in the proposed corridor, although listed in Part 575, are compatible with overhead transmission ROWs and even encouraged, because of their low height.

4.6.5 Potential Terrestrial Vegetation and Wildlife Impacts and Mitigation Measures

4.6.5.1 Terrestrial Vegetation Potential Impacts and Proposed Mitigation

Most of the vegetation that will be impacted within the terrestrial transmission line corridor consists of previously disturbed and actively managed herbaceous and/or shrubby cover within existing ROWs. Similarly, vegetation at the landfall sites is maintained in herbaceous cover. Herbaceous and shrubby vegetation within the areas impacted by construction is expected to recover quickly following restoration and stabilization of the construction corridor. Some clearing and conversion of forest vegetation to herbaceous vegetation will occur where the proposed corridor deviates from the existing NYPA ROW;

crosses uncleared ravines along the NYPA ROW; and crosses forested areas within the I-84 median (see Figure 2-6 in **Exhibit 2: Location of Facilities** for areas of permanent tree clearing). Approximately 38 acres of forestland in these areas will be permanently cleared, based on a conservative permanent cleared width of approximately 50 ft (15.2 m) (the Applicant will refine the width of the permanent maintained corridor during final design and include updated impact calculations, as necessary, in the EM&CP). Additional tree clearing will be necessary for workspace along the deviations and uncleared ravines in the NYPA ROW. This area of additional tree clearing is separate from the permanent cleared area and would be allowed to revegetate. Similarly, tree clearing will be required in many locations along the edge of the NYPA ROW in areas where additional workspace is needed to address site-specific conditions, such as steep slope areas and/or locations where clearance between existing overhead transmission and maintained ROW is inadequate, or to facilitate trenchless crossings of sensitive resources. The area required for workspaces and associated clearing will be determined during detailed design and construction planning, and these specific locations will be established at the EM&CP stage. Based on a preliminary assessment of likely workspace requirements (e.g., in areas of steep slopes), the Applicant estimates that approximately 139 acres of additional tree clearing will be required for construction workspace. The Applicant will refine this estimate during detailed design and identify areas of tree clearing in the Project EM&CP, including procedures for management of the logs and debris.

Based on the current design, the Applicant anticipates that up to 5 acres of vegetation will be permanently removed to construct and operate the northern converter station. Permanently impacted vegetation will be a mixture of forestland and hayfield. Vegetation within the remainder of the northern converter station site (47 acres) may be temporarily disturbed during construction activities but will be restored to its current condition. No vegetation will be impacted at the southern converter station site.

At this time, Project design includes the preliminary locations of construction access roads; however, final access road design is not complete. The Applicant plans to use existing access roads to the maximum extent possible which will limit any impacts to vegetation, although additional tree clearing will likely be required for construction access roads. Additional details will be provided in the EM&CP.

Long-term vegetation management of the transmission line ROW is discussed in Section 4.14.6.

4.6.5.2 Terrestrial Wildlife Potential Impacts and Proposed Mitigation

Use of existing ROW for most of the terrestrial transmission line will reduce potential impacts because the impacted areas in the existing ROW are already used by landowners for a variety of activities. Additionally, the ROW is inspected and managed routinely to ensure safe and reliable electric service. Deviations from existing ROW, most notably the Neversink and Beaver Kill crossings, will result in the clearing of up to 7 acres and 16 acres of forest habitat, respectively (based on a conservative 150-ft wide clearing width to provide construction workspace). In addition to the forest clearing, the new corridor in these areas will result in forest fragmentation and edge effects to approximately 79 acres of forest habitat, calculated as former interior forest now within 300 ft (91 m) of the new ROW. This forest fragmentation and edge effect will result in a corresponding decrease in available habitat for interior forest-dwelling bird species. However, the amount of fragmented forest habitat is small in relation to the surrounding interior forest habitat. In addition, the permanently maintained corridor is only expected to be approximately 40 ft (12.2 m) wide, which will minimize any permanent impacts to forest habitat.

During construction, wildlife may be disturbed by noise, vegetation clearing, lighting, and construction activities within the impact corridor and any additional workspaces. Mobile animals will be temporarily displaced from the construction area and immediately adjacent areas, moving into similar habitats nearby for the duration of construction. These species will then return to the area once construction and restoration of disturbed areas

are completed. Smaller and less mobile organisms, such as turtles, amphibians, and small mammals, could experience direct mortality from vehicles and equipment within the construction corridor.

Any clearing of herbaceous, shrubby, or forested vegetation along the terrestrial transmission line occurring during the breeding bird season, which for most species extends from May through July, could directly impact bird nests. Other construction activities during this time could cause nest abandonment in the immediate vicinity. To minimize potential impacts to threatened and endangered bat species, the Applicant plans to conduct clearing between November 1 and March 31 to the greatest extent practicable, which will also minimize impacts to breeding birds. The Applicant will continue to consult with NYSDEC and USFWS to determine appropriate avoidance and minimization measures related to breeding bird species.

Waterfowl, gulls, and terns present within the Hudson, Harlem, and East Rivers and along the shorelines in proximity to landfall sites could be disturbed from foraging areas during construction activities. However, these birds would generally be expected to avoid the construction work areas and move to other nearby areas of suitable habitat. No long-term impacts to these species are expected because no sensitive breeding habitat (i.e., freshwater or brackish tidal marshes) will be impacted, and impacts to shorelines will be avoided by using HDD for the transmission line landfalls.

Although the northern converter station will result in the permanent loss of approximately 5 acres of habitat (forestland and hayfield), the loss of this habitat would not cause any population-level effects or redistribution of wildlife in the local area.

Potential impacts to protected species and important habitats are discussed in Section 4.10.4.

4.6.5.3 Invasive Species Potential Impacts and Proposed Mitigation

Construction activities may promote the introduction or spread of invasive species by transplanting seeds via topsoil, gravel, and straw, or by construction workers and equipment. The Applicant will complete a targeted baseline survey for invasive species prior to construction and all invasive species infestation areas will be mapped. The Applicant will use the survey results to prepare an invasive species management plan which will be included in the EM&CP. The plan will include measures to mitigate the potential spread of invasive species. The following invasive species management strategies will form the basis of the plan:

- Areas identified during pre-construction surveys containing an infestation of invasive species will be identified on plan and profile drawings in the EM&CP.
- Prior to the start of construction activities, onsite personnel will be trained in BMPs and good housekeeping procedures to follow if invasive species are encountered, especially near wetlands, wetland adjacent areas, and riparian areas.
- In areas where soil has been disturbed due to Project related activities, specifically over the installed cable, the soil will be restored to original grade and stabilized with a native seed mix and weed-free mulch.

4.7 Wetlands and Water Resources

Pursuant to 16 NYCRR § 86.5, this section describes freshwater and tidal wetlands, freshwater streams and waterbodies, groundwater, and floodplains in and near the proposed transmission line corridor. Potential impacts to wetlands and freshwater resources associated with construction and operation of the Project are discussed. This section also includes the Project-specific measures that the Applicant will implement to avoid, minimize, and/or mitigate potential impacts to wetlands and freshwater resources.

Wetlands and waterbodies in New York may be protected under federal law, New York State law, or both. The Clean Water Act (CWA) regulates activities within jurisdictional waters of the United States, which include navigable waterways and their tributaries, bordering wetlands, and any other bordering or isolated waters, including tidal waters, with a significant nexus to other waterways, such that the use, degradation, or destruction of those waters could affect interstate or foreign commerce. USACE administers permitting and compliance under Section 404 of the CWA, which regulates discharge of dredged or fill material into waters of the United States. Construction of a transmission line within navigable waterways, such as the Hudson, Harlem, and East Rivers, additionally requires authorization from USACE under Section 10 of the Rivers and Harbors Act of 1899 (RHA).

Freshwater wetlands in New York State are regulated under the Freshwater Wetlands Act (FWA), Article 24 of the Environmental Conservation Law (ECL), and 6 NYCRR Part 663, which are administered by NYPSC for major transmission facilities such as the Project. Mapped wetlands that are at least 12.4 acres in size and found in the NYSDEC Environmental Resource Mapper (ERM) freshwater wetland database, or that are of unusual local importance pursuant to FWA, Article 24 of the ECL, are subject to regulation under the FWA. The FWA also applies to 100-ft (30-m) wetland "adjacent areas" or buffer areas, which are generally defined as those areas of land or water that are outside of the wetland and within 100 ft (30 m) of the surveyed wetland boundary. The FWA also applies activities within the 100-ft adjacent area outside of the wetland boundary.

Tidal wetlands in New York are protected under Article 25 of the ECL and are considered "those areas which border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters." In addition, per 6 NYCRR § 661.4, adjacent areas up to 300 ft (91.4 m) (150 ft [45.7 m] within New York City) inland from the tidal wetland boundary are regulated to provide further protection to tidal wetland resources. NYSDEC also regulates activities in tidal wetlands and adjacent areas.

Under Article 15 of the ECL, New York classifies surface water resources by their best uses (fishing, source of drinking water, etc.; 6 NYCRR Part 701) or as Wild, Scenic and Recreation Rivers (6 NYCRR Part 666). State water quality classifications of freshwater watercourses fall into four categories, based on the assigned best uses by NYSDEC:

- Classification AA or A: source of drinking water;
- Classification B: swimming and other contact recreation but not for drinking water;
- Classification C: waters supporting fisheries and suitable for non-contact activities; and
- Classification D: lowest classification/standard.

Freshwater water resources with classifications AA, A, B, and C may also have a standard of (T), indicating that the resource may support a trout population, or (TS), indicating that it may support trout spawning. Special requirements apply to sustain these waters that support these valuable and sensitive fisheries resources (Section 4.9.2 contains a discussion of trout resources). Water quality classifications for tidal waterbodies are discussed in Section 4.8.

Flood Hazard Areas are those areas of land that would be covered by the floodwaters of the base flood, also known as the 100-year flood, which is defined as a flood that statistically has a 1% probability of being equaled or exceeded any given year. Development within floodplains in New York State is subject to local law requirements imposed by municipalities (e.g., town, city, or village) that participate in the National Flood Insurance Program. Procedural requirements to obtain any local approval, consent, permit, or certificate are pre-empted under PSL § 130. Additional information on local ordinances, including those

associated with floodplain development, and their applicability to the Project is provided in **Exhibit 7: Local Ordinances**.

4.7.1 Wetlands and Freshwater Resources Studies and Analyses

Available environmental data sources were used for the evaluation of wetlands and freshwater resources. These include: the USFWS NWI database, NYSDEC ERM Wetlands Databases (freshwater and tidal), NYSDEC Water Quality Classification Database, USGS SGS National Hydrographic Dataset, USGS water resources investigations reports, NYSDEC mapped wells, SSURGO Soils, National Flood Hazard Layer geospatial database, FIRM floodplain mapping, and recent and historic satellite imagery.

Field delineations were also performed along the terrestrial transmission line corridor and at the converter station and landfall sites. The field delineations were conducted at varying times from October 18, 2021, through June 14, 2022, during appropriate survey conditions. The wetland delineation methodologies outlined in the *1987 Corps of Engineers Wetlands Delineation Manual* (1987 Corps Manual) (USACE 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual Northcentral and Northeast Region* (NC&NE Regional Supplement) (USACE 2011), and the *New York State Freshwater Wetlands Delineation Manual* (NYSDEC 1995) were used to identify and delineate wetlands. Wetlands identified were classified consistent with the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). The methods used to delineate wetlands, streams/rivers, and other waterbody features are further described in the Project's WDR (Appendix H to this Exhibit).

4.7.2 Existing Freshwater Wetlands

A total of 16 NYSDEC-mapped freshwater wetlands are present within the terrestrial transmission line corridor. The 500-ft (152-m) check zones of an additional 24 freshwater wetlands are mapped within the terrestrial corridor. A summary of the NYSDEC-mapped freshwater wetlands and 500-ft (152-m) check zones mapped within the terrestrial transmission line corridor is provided in Table 4-7. These features are also shown on Figure 3 of the WDR in Appendix H to this Exhibit.

Table 4-7. NYSDEC-Mapped Freshwater and Freshwater Tidal Wetlands and Check Zones within the Terrestrial Transmission Line Corridor

NYSDEC Wetland ID	NYSDEC Class[1]	Feature Type (Wetland or Check zone)	Area (Acres)
DL-15	1	500-ft check zone	4.0
GO-40	2	500-ft check zone	8.5
GO-6	2	500-ft check zone	2.9
GO-8	2	wetland and check zone	19.3
H-6 (tidal)	1	500-ft check zone	0.9
H-6	1	500-ft check zone	0.7
HA-22	3	500-ft check zone	4.5
HA-3	2	500-ft check zone	5.2
HA-5	3	wetland and check zone	7.0
LM-18	2	wetland and check zone	7.3
LW-28	2	wetland and check zone	5.7
LW-30	2	500-ft check zone	5.4
LW-4	2	500-ft check zone	4.0

NYSDEC Wetland ID	NYSDEC Class[1]	Feature Type (Wetland or Check zone)	Area (Acres)
MD-17	4	wetland and check zone	4.9
MD-18	2	wetland and check zone	6.4
MO-62	2	wetland and check zone	35.5
NB-21	1	500-ft check zone	4.2
NB-25	2	wetland	0.1
NB-26	2	500-ft check zone	5.9
NB-29	2	500-ft check zone	0.0
OT-1	2	500-ft check zone	4.0
OT-18	2 and 3	wetland and check zone	4.5
OT-19	2	wetland and check zone	13.6
OT-5	2	wetland and check zone	10.8
PE-4	2	500-ft check zone	0.8
PK-2	2	500-ft check zone	23.9
RO-3	2	500-ft check zone	0.7
RO-7	3	wetland and check zone	5.3
RO-9	2	500-ft check zone	8.4
WD-36	2	500-ft check zone	0.7
WD-37	2	500-ft check zone	7.9
WD-38	2	500-ft check zone	8.7
WD-46	2	500-ft check zone	16.6
WD-47	2	wetland	0.3
WL-19	2	wetland and check zone	10.5
WL-31	3	wetland and check zone	11.1
WL-56	2	500-ft check zone	3.2
WL-7	2	wetland and check zone	10.1
YL-20	2	500-ft check zone	4.9
YL-27	2	500-ft check zone	8.3
YL-28	2	500-ft check zone	3.3
		Total	289.5

[1] Per 6 NYCRR § 664.5, not all wetlands supply equal benefits and depend upon several parameters like ecological associations (wetland and waters connectivity), special features (T&E species presence, migratory species, etc.), hydrological and pollution control features, distribution and location (i.e., proximity to an urban area or within state lands), and cover type (i.e., vegetative cover). Class I wetlands are afforded the highest level of protection while Class IV wetlands are afforded the lowest level of protection.

The NYSDEC ERM Wetlands Database did not show any NYSDEC-mapped freshwater wetlands within the northern or southern converter station locations or landfall sites.

A total of 334 uniquely named wetlands (480 occurrences) were delineated within the terrestrial transmission line corridor; one unique name was assigned to each wetland, even if the wetland was classified as multiple Cowardin classification types (occurrences). No wetlands were delineated within the

northern or southern converter stations or landfall sites. The boundaries of delineated wetlands are shown in Figure 5 of the WDR (see Appendix H to this Exhibit). Table 4-8 summarizes the wetlands identified during the field delineation. Information for each wetland delineated within the terrestrial corridor is provided in Attachment 4 to this Exhibit.

Table 4-8. Summary of Delineated Freshwater Wetlands within the Terrestrial Transmission Line Corridor

Cowardin Classification Type	Number of Wetlands	Length Crossed (miles) in Terrestrial Corridor	NYSDEC Wetland Crossed in Corridor (miles)
Palustrine Emergent	305	9.2	0.4
Palustrine Scrub-Shrub	152	5.2	1.0
Palustrine Forested	11	1.0	0
Palustrine Unconsolidated Bottom	12	0.2	0
Total	480[1]	15.6	1.4

[1] This total exceeds the 334 uniquely named wetlands due to some wetlands containing more than one wetland community classification.

Of the 334 wetlands identified during survey efforts, 21 occur in, or in proximity to, areas mapped by NYSDEC as State-regulated resources, and therefore are potentially afforded protection under Article 24 of the ECL (hereafter referred to as State-regulated wetlands). Detailed descriptions of the freshwater wetland community types present in the terrestrial transmission line corridor are included in the WDR (see Appendix H to this Exhibit).

4.7.3 Existing Tidal Wetlands

Tidal wetlands are defined under New York ECL Article 25-0103 as:

> *(a) those areas which border on or lie beneath tidal waters, such as, but not limited to, banks, bogs, salt marsh, swamps, meadows, flats or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters; and*
>
> *(b) (b) all banks, bogs, meadows, flats and tidal marsh subject to such tides, and upon which grow or may grow some or any of the following: salt hay (Spartina patens and Distichlis spicata), black grass (Juncus Gerardi), saltworts (Salicornia ssp.), sea lavender (Limonium carolinianum, tall cordgrass (Spartina pectinata and Spartina cynosuroides), hightide bush (Iva frutescens), cattails (Typha angustifolia and Typha latifolia), groundsel (Baccharis halmilifolia), marsh mallow (Hybiscus palustris) and the intertidal zone including low marsh cordgrass (Spartina alterniflora).*

NYSDEC's regulations implementing ECL Article 25 are codified at 6 NYCRR § 661, which sets out the Tidal Wetlands Land Use Regulations for the State. Under these implementing regulations, tidal wetlands are further defined at 6 NYCRR § 661.4 as:

> *Tidal wetlands or wetland shall mean any lands delineated as tidal wetlands on an inventory map and shall comprise the following classifications as delineated on such map:*
>
> *(1) Coastal fresh marsh.*

The tidal wetland zone, designated FM on an inventory map, found primarily in the upper tidal limits of riverine systems where significant fresh water inflow dominates the tidal zone. Species normally associated with this zone include narrow leaved cattail, Typha angustifolia the tall bracklish water cordgrasses, Spartina pectinata and/or S. cynosuroides; and the more typically emergent fresh water species such as arrow arum, Peltandra; pickerel weed, Pondederia; and cutgrass, Leersia.

(2) Intertidal marsh.

The vegetated tidal wetland zone, designated IM on an inventory map, lying generally between average high and low tidal elevation. The predominant vegetation in this zone is low marsh cordgrass, Spartina alterniflora.

(3) Coastal shoals, bars and flats.

The tidal wetland zone, designated SM on an inventory map, that (i) at high tide is covered by water, (ii) at low tide is exposed or is covered by water to a maximum depth of approximately one foot, and (iii) is not vegetated by low marsh cordgrass, Spartina alterniflora, except as otherwise determined in a specific case as provided in § 661.16 of this Part.

(4) Littoral zone.

The tidal wetlands zone, designated LZ on an inventory map, that includes all lands under tidal waters which are not included in any other category, except as otherwise determined in a specific case as provided in § 661.16 of this Part. Provided, there shall be no littoral zone under waters deeper than six feet at mean low water. Pending determination by the commissioner in a particular case, the most recent, as of the effective date of this Part, national ocean survey maps published by the national ocean survey, national oceanic and atmospheric administration shall be rebuttable presumptive evidence of such six foot depth.

(5) High marsh or salt meadow.

The normal uppermost tidal wetland zone, designated HM on an inventory map, usually dominated by salt meadow grass (Spartina patens) and spike grass (Distichlis spicata). This zone is periodically flooded by spring and storm tides and is often vegetated by low vigor, Spartina alterniflora and Seaside lavender, Limonium carolinianum. Upper limits of this zone often include black grass, Juncus Gerardi; chairmaker's rush, Scirpus sp;marsh elder, Iva frutescens; and groundsel bush, Baccharis halimifolia.

(6) Formerly connected tidal wetlands.

The tidal wetlands zone, designated FC on an inventory map, in which normal tidal flow is restricted by man-made causes. Typical tidal wetland plant species may exist in such areas although they may be infiltrated with common reed, Phragmites sp.

One tidal wetland (W-T28-029; listed as NYSDEC Wetland ID H-6 in Table 4-7) was delineated and mapped during field surveys in proximity to the proposed terrestrial transmission line corridor at the southeastern end of Croton Point. Per the NYS tidal wetland regulations and based on the non-engineered condition of the adjacent coastal bank in this location, the State-regulated adjacent area for this tidal wetland is a 300 ft (91 m) buffer. No portion of the regulated adjacent area of this tidal wetland is within the terrestrial corridor.

No tidal wetlands mapped by NYSDEC as coastal fresh marsh; intertidal marsh; coastal shoals, bars and flats; high marsh or salt meadow, or formerly connected tidal wetlands are crossed by the transmission line corridor. Per the littoral zone definition provided above, tidal wetlands include all areas mapped shallower than 6 ft (1.8 m) at MLW and that are affected by either marine, estuarine, or freshwater tidal hydrologic influences. With respect to the proposed Project corridor, tidal wetlands in the Hudson River and its tributaries are marine and/or estuarine influenced up the river to the first dam located in Troy, New York,

where they are considered freshwater tidal wetlands at that location (see Section 4.7.1). Based on analysis of Project-specific bathymetric survey data, the submarine corridor crosses approximately 5.2 miles of littoral zone tidal wetlands as defined above. Due to the very narrow strips of littoral zone tidal wetlands crossed, they only cover approximately 7.3 acres of the proposed submarine corridor

4.7.4 Existing Freshwater Resources

4.7.4.1 Watersheds

The terrestrial transmission line corridor is located within the Mid-Atlantic region (Hydrologic Unit Code [HUC] 2); the Lower Hudson, Upper Hudson, and Upper Delaware basins (HUC 6); and the Basher Kill, Beaver Kill, Bronx River-East River, Callicoon Creek-Delaware River, Lower East Branch Delaware River, Lower Wallkill River, Middle East Branch Delaware River, Middle Wallkill River, Middle West Branch Delaware River, Mongaup River, Moodna Creek, Neversink River, Peekskill Hollow Creek-Hudson River, Quassaic Creek-Hudson River, Saw Mill River-Hudson River, Shawangunk Kill, and Willowemoc Creek (HUC 10) watersheds.

New York State has eight use classifications for fresh surface waters and watersheds according to "best use" classification. They are listed in order of protection (N affords the most and D the least): N, AA-special (AA-S), A-special (A-S), AA, A, B, C, and D. Classes AA-S, A-S, AA (collectively Class AAs) and A all support use as a drinking water source, culinary or other food processing source, recreation, fishing, and for fish propagation; Classes B, C, and D are not a source for drinking water and are used for recreation and fishing.

The terrestrial transmission line corridor crosses 15.8 miles of five separate Class AAs watersheds (HUC level 12) in Delaware County along the NYPA Marcy South ROW (see Table 4-9). Three of the five Class AAs watersheds are part of the New York City Watershed: Platner Brook-West Branch Delaware River; Bagley Brook-West Branch Delaware River; and Murphy Hill Brook-Pepacton Reservoir. The combined crossing distance of these watersheds is 13 miles. The Class AAs and New York City Watershed boundaries in relation to the terrestrial transmission line corridor are shown on Figure 4-4 (see Attachment 1 to this Exhibit).

Table 4-9. Class AAs Watersheds Crossed by the Terrestrial Transmission Line Corridor

NY Watershed Basin ID	HUC 12 Watershed Name	Watershed Length in Corridor (Miles)	Watershed Area in Corridor (Acres)	Length of Delineated Streams in Corridor (Feet)	Within NYC Water Supply Watershed
7126	Platner Brook-West Branch Delaware River	2.74	100.7	505	Yes
6967		0.73	74.8	925	
6907		0.57	36.2	292	
7164		0.29	83.0	514	
7201	Bagley Brook-West Branch Delaware River	2.76	68.5	704	
8338	Lower Willowemoc Creek	1.39	26.6	833	No
8406	Little Beaver Kill	1.37	25.6	342	No
7385	Murphy Hill Brook-Pepacton Reservoir	2.30	44.5	981	Yes
7490		2.25	43.6	971	

NY Watershed Basin ID	HUC 12 Watershed Name	Watershed Length in Corridor (Miles)	Watershed Area in Corridor (Acres)	Length of Delineated Streams in Corridor (Feet)	Within NYC Water Supply Watershed
7474		1.40	29.2	315	
Total		**15.78**	**532.7**	**7,424**	

The New York City Watershed covers about 2,000 square miles of southeastern New York and encompasses three main watersheds: the Catskill and Delaware Watersheds to the west of the Hudson River and the Croton Watershed to the east. The terrestrial transmission line corridor is within the Delaware Watershed. This system provides high quality drinking water to more than nine million people in New York City and its suburbs. More than one billion gallons of unfiltered drinking water is delivered by gravity each day from 19 reservoirs and transported via three massive aqueducts (NYSDEC 2022e).

Most of the water contained in the New York City Watershed system is provided by precipitation (rain and snow) that falls within the watershed and is conveyed to the reservoirs by numerous streams. Each of the 19 reservoirs and their major tributaries are monitored continuously (NYSDEC 2022e).

The New York City Watershed Agreement was signed in January 1997 to protect the quality of the New York City Watershed. NYCDEP in partnership with NYSDEC is responsible for the management and protection of the New York City Watershed Program (NYCWP). Under authority granted by New York State's Public Health Law, NYCDEP has enacted regulations to protect the existing high quality of the New York City water supply and preserve it from future degradation (NYCDEP 2019a); such regulations apply to NYPSC in its supervision of the Project under PSL Article VII. Activities associated with the proposed Project, specifically land clearing and land grading within 100 ft (30 m) of a watercourse or wetland within the New York City Watershed, are subject to the NYCDEP Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and its Sources (NYCDEP 2019a).

Within the portion of the terrestrial transmission line corridor that crosses the New York City Watershed, 34 delineated streams are present for a total of 9,081 ft (2,768 m). At its closest, the terrestrial transmission line corridor is within 2.5 river miles upstream of the Pepacton Reservoir where the corridor crosses an unnamed tributary to Bryden Hill Brook and approximately 23 miles upstream of the Cannonsville Reservoir.

The terrestrial transmission line corridor also crosses the following aqueducts that provide water to New York City, as shown on Figure 4-4 (see Attachment 1 to this Exhibit):

- West Delaware Aqueduct – conveys water from Cannonsville Reservoir to Rondout Reservoir; corridor crossing is in the vicinity of the East Branch Delaware River (Hancock, Delaware County, New York); and
- Catskill Aqueduct – conveys water from Ashokan Reservoir to Kensico Reservoir; two corridor crossings: one is in the vicinity of I-84 and South Plank Road (Newburgh, Orange County, New York), the other is in the vicinity of the Hudson River (Cornwall, Orange County, New York).

The other two AAs watersheds crossed by the transmission line corridor, Lower Willowemoc Creek and Little Beaver Kill, are crossed for a combined 2.8 miles. The corridor crosses one Class AA stream in these watersheds, Abe Wood Brook.

4.7.4.2 Stream and Riverine Resources

Stream and riverine resources are defined herein as lotic, or flowing water, systems. NYSDEC ERM mapping identifies 79 unique streams, with 185 occurrences, within the terrestrial transmission line corridor. An occurrence is determined as an individual stream segment within the ROW that could be a part of a larger system (i.e., Stream "A" meanders in and out of the ROW, where each segment, or reach, may have a different calculated length and area). There are no NYSDEC Wild, Scenic, and Recreational Rivers and no national Wild and Scenic Rivers within the corridor. No NYSDEC-mapped streams are located within the converter station and landfall sites.

New York State classifies streams according to freshwater use classification. These stream classifications could be followed by a standard of either "T" or "TS" that is described in more detail in Section 4.7.4.2. The classification rankings are as follows:

- Class AA and A are designated for drinking water;
- Class B is designated public for swimming and contact recreation activities;
- Class C is designated for fishing and non-contact activities; and
- Class D is designated as not supportive of any of the aforementioned uses.

Field delineations identified 221 freshwater streams, which account for 231 occurrences (e.g., crossings) within the terrestrial transmission line corridor, including 94 streams that are classification C(T) or higher. A total of 132 streams were classified as perennial, 78 streams were classified as intermittent, and 19 streams were classified as ephemeral. A summary of field-delineated streams within the terrestrial transmission line corridor, by flow regime, is provided in Table 4-10 and illustrated on Figure 5 of the WDR (see Appendix H to this Exhibit). Stream data forms (including information regarding flow regime, ordinary high-water mark width, depth, substrate, observed water quality, bank slope, bank substrate, gradient, and adjacent vegetation) are provided in Appendix A-4 of the WDR (Appendix H). Appendix A-2 of the WDR (Appendix H to this Exhibit) provides tables with stream name, flow regime, NYSDEC stream

classification, and linear feet within the terrestrial transmission line corridor. Information for each stream delineated within the terrestrial corridor is also provided in Attachment 5.

No streams were delineated within the converter station or landfall sites. One stream, East Platner Brook (Class C(TS)), was delineated approximately 100 ft (30 m) to the east of the northern converter station site.

Table 4-10. Summary of Delineated Freshwater Streams within the Terrestrial Transmission Line Corridor

Flow Regime	Number of Freshwater Streams	Length within the Corridor (ft)	Number of Class C(T) or Higher Streams
Ephemeral	19	2,808	0
Intermittent	78	15,941	1
Perennial	134	32,176	93
Total	231	50,926	94

Lotic systems (i.e., streams, rivers, and other drainages) are sorted into three classes to support the discussion of Project stream crossings by the Project as follows:

- Minor Stream Resources – defined as less than 10 ft (3 m) in width;

- Intermediate Stream Resources – that are defined as 10 ft to 100 ft (3 m to 30 m) in width; and
- Major Stream Resources – defined as greater than 100 ft (30 m) in width.

Minor Stream Resources

Minor crossings account for the majority of the stream crossings, with 199 minor crossings out of the total 231 delineated streams, or approximately 86% of the crossings. These total 40,206 ft (7.6 miles [12 kilometers]) within the terrestrial transmission line corridor. Two of these minor streams (Abe Wood Brook and an unnamed tributary to Matawa Lake) are classified by NYSDEC as AA streams. The flow regimes of the minor streams include 19 ephemeral, 77 intermittent, and 103 perennial streams. The widths of the stream crossings range from 1 ft (0.3 m) to a maximum of 10 ft (3 m); the average width is estimated to be 3 ft (1 m). These streams were typically high order streams found where topographic relief is greater (i.e., mountainous terrain). The stream gradients ranged from flat-moderate (0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]) to severe (>10-ft per 100-ft [3-m per 30-m]). Stream bottom substrates primarily comprised exposed bedrock, boulder, and cobble with other inclusions of sand, silt, and gravel. All of the streams were observed to have shallow water depths, ranging from approximately 0-ft (0 m) (dry) to 1 ft (0.3 m) during the course of the stream delineations. Bank heights for these systems ranged from 0.5-ft to 12-ft (0.2-m to 4-m) with the majority less than 3-ft (1-m) in height.

Intermediate Stream Resources

Intermediate crossings within the terrestrial transmission line corridor account for 10,026 ft (3,056 m) across the Project, with 29 total crossings or approximately 12.5% of all crossings. These include 15 named streams: Bagley Brook, Basher Kill, Cattail Brook, East Platner Brook, Kine Brook, Mannayunk Kill, Mercer Brook, Monhagen Brook, Mongaup River, Peaks Brook, Shawangunk Kill, Trout Brook, West Branch Delaware River (a USACE traditionally navigable waterway), West Platner Brook, and Wilson Hollow Brook. Two of these streams (Shawangunk Kill and an unnamed tributary to Indigot Creek) are listed as "A" streams by NYSDEC. The flow regimes were observed to include 28 perennial streams and 1 intermittent stream. The crossing widths of the streams range from 13 ft (4 m) to a maximum of 80 ft (24 m), with an average width of 29 ft (9 m) across all the intermediate crossings. Stream gradients ranged from flat-moderate (0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]) to moderate (2-ft to 5-ft per 100-ft [0.6-m to 1.5 m per 30 m]). Water depths ranged from approximately 2 in (0.1 m) to 2 ft (0.6 m) over the course of the field delineations. Substrate composition included bedrock, boulder, and cobble to sand, silt and gravel. Bank heights for these systems ranged from 1 ft to 4 ft (0.3 m to 1.2 m).

Major Stream Resources

Major crossings within the terrestrial transmission line corridor account for 693 ft (211 m) across the extent of the Project and are represented by three perennially flowing river crossings, or approximately 1.2% of the total Project stream crossings. These three rivers are the Neversink River, the East Branch of the Delaware River, and the Wallkill River. Note that the width of the Beaver Kill is greater than 100 ft within the NYPA ROW, but is slightly less than 100 ft (30.5 m) at the location of the proposed crossing. The Neversink River was given a NYSDEC class and standard of B(T), and the East Branch Delaware River was given a NYSDEC class and standard of C(T). Each major stream is listed as a USACE traditional navigable waterway. The minimum crossing width is 105 ft (32 m); the maximum is 250 ft (76 m), and the average is 177 ft (54 m). The stream gradients are characterized as flat (0.0-ft to 0.5-ft per 100-ft [0.0-m to 0.2-m per 30 m]) to flat-moderate 0.5-ft to 2-ft per 100-ft [0.2-m to 0.6-m per 30 m]). Bank heights range from 3 ft to 8 ft (1 to 2 m). Observed substrate composition ranged from bedrock, boulder, and cobble to sand, silt and gravel.

4.7.4.3 Trout and Trout Spawning Stream Classifications

In addition to designating stream classifications, NYSDEC also designates a standard of either "T" or "TS" to these classifications. This offers another level of protection to the stream. The designation of "T" indicates that the waterbody could support a trout population, and "TS" indicates that the waterbody could support trout spawning. Special requirements are provided to these as valued resources. If streams have a class of AA, A, B, or C (with the "T" or "TS" standard), they are considered "protected streams." Of the 221 delineated streams, 94 streams are potentially considered protected with the aforementioned designations. More information relating to trout streams is discussed in Section 4.9.2.4.

4.7.4.4 Other Freshwater Resources

A total of 11 other waterbodies (e.g., lentic, non-flowing systems) were mapped during field delineations within the terrestrial transmission line corridor. Combined, they occupy approximately 4.1 acres within the terrestrial corridor. The waterbodies observed are relatively small and include a mix of artificial impoundments (i.e., storm water basins, residential ponds, farm ponds) and natural ponded areas within wetland complexes. The five artificial impoundment waterbodies total approximately 2.0 acres and the six natural ponded waterbodies total approximately 2.1 acres. Two of the natural ponded areas occur within mapped NYSDEC freshwater wetlands LW-4 and WL-7.

4.7.5 Existing Groundwater

Groundwater occurs in saturated zones under the land surface; this is where the water table occurs. Groundwater fills pores and fractures in subsurface materials such as soils, gravel, sand, and bedrock. Along the terrestrial transmission line corridor, groundwater is found in glacial deposits, fluvial deposits of sand and gravel as well as floodplain deposits of silt, sand, and gravel, and bedrock formations. Aquifer recharge occurs from precipitation directly on the land by seepage from tributary streams, rivers, and lakes flowing across the aquifer by subsurface flow from till on sides of the valleys, and by seepage from bedrock and deposits of low permeability adjacent to aquifers (USGS 2019).

In New York State, to enhance regulatory protection in areas where groundwater resources are most productive and most vulnerable, the New York State Department of Health (NYSDOH) identifies Primary Water Supply Aquifers, also referred to as Primary Aquifers. The terrestrial transmission line corridor crosses one unnamed Primary Aquifer along the Route 9/9A corridor in Westchester County. The crossing distance is about 3.5 miles, ending at Croton Point.

As defined by EPA, a sole source aquifer is one which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. Such areas have no alternative drinking water source that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water (EPA n.d.). No portion of the Project crosses or overlies a sole source aquifer.

Seeps and springs are areas where groundwater emerges to the surface and often forms and/or feeds into a waterbody or wetland. In general, waters from seeps and springs eventually find their way to surface waters through overland flow or ground percolation. Seeps and springs were identified within the terrestrial transmission line corridor during wetland field investigations. In total, 21 seeps and/or springs were identified, all of which are in Sullivan and Delaware Counties (18 in Sullivan County and 3 in Delaware County), where water was observed discharging from below ground to the surface. Seep and spring locations are shown on Figure 6 of the WDR in Appendix H to this Exhibit.

No private or municipal wells were identified incidentally during wetland and other field surveys within the terrestrial transmission line corridor. The Applicant will correspond with abutting landowners to identify wells prior to construction; any wells identified within 50 ft (15 m) of the construction workspace will be identified in the EM&CP.

4.7.6 Existing Floodplains

FEMA is responsible for mapping and delineating floodplains and determining the flood risk for susceptible areas. The National Flood Hazard Layer is a geospatial database that contains current flood hazard data, provided by FEMA within the United States. FIRM mapping issued by FEMA includes Special Flood Hazard Areas (SFHAs), Base Flood Elevation, and risk zones applicable to an area. Special Flood Hazard Areas are areas that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. This 1% annual chance flood is also referred to as the base flood or 100-year flood.

As summarized in Table 4-11, the proposed transmission line corridor crosses 4.4 miles of SFHAs (i.e., 100-year floodplains). FEMA-mapped 100-year floodplain crossings are shown on Figure 3 in the WDR (Appendix H to this Exhibit). As shown, floodplain crossings occur predominantly as relatively narrow crossings along stream systems.

Table 4-11. FEMA-Mapped Special Flood Hazard Areas Crossed by the Terrestrial Transmission Line Corridor

FEMA Flood Zone	Flood Zone Name	Flood Zone Description	Distance
A	100-yr Flood Zone (w/out Base Elevations	Areas with 1% annual chance of flooding	0.7
AE	100-yr Flood Zone (w/ Base Elevations)	Areas with 1% annual chance of flooding (base flood elevation)	X3.7
VE	100-yr Flood Zone (Coastal)	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves.	<0.1
Total			**4.4**

The southern converter station site includes 0.4 acres of SFHEs (Zone AE). No SFHAs are present within the northern converter station site.

4.7.7 Wetlands and Water Resources Impacts and Mitigation Measures

Locations currently identified by the Applicant for trenchless crossings of wetlands and streams are listed in Table 4-12, subject to confirmation from ongoing geotechnical investigation and detailed design. The Applicant is in the process of consulting with NYSDPS and NYSDEC regarding crossing methods for all State-regulated streams and wetlands within the Project area, so this table is not a final list of trenchless crossing locations. The Applicant is also in the process of conducting and reviewing results of geotechnical investigations to assess the feasibility of trenchless crossings at numerous locations. An updated list of trenchless crossing locations will be provided in the Project's EM&CP.

Table 4-12. Working List of Trenchless Crossing Locations for Wetlands and Streams

Feature	Location			Approximate Crossing Distance (feet)	Trenchless Crossing Method
	Mile-post	Town	County		
West Branch Delaware River	2.3	Delhi	Delaware	1,660	HDD
East Branch Delaware River	26.7	Hancock	Delaware	TBD	Crossing method to be determined based on geotechnical investigation results
Beaver Kill	30.7	Colchester	Delaware	1,980	HDD
NYSDEC Wetland LM-18	42.0	Liberty	Sullivan	990	HDD
Beaver dam/pond (NYSDEC Wetland LW-4)	45.6	Liberty	Sullivan	1,050	HAB
Mongaup River	59.4	Bethel/Thompson	Sullivan	1,170	HDD
NYSDEC Wetland MO-62	64.8	Monticello	Sullivan	11,000	Series of HDDs
Neversink River	70.3	Thompson	Sullivan	1,200	HDD
Basher Kill	80.6	Cuddebackville	Orange	1,550	HDD
Monhagen Brook	92.6, 93.4, 94.0	Wawayanda	Orange	1,140	HDD
Wallkill River	103.5	Montgomery	Orange	1,230	HDD
Landfall 1 – Newburgh-Beacon Bridge	117.2	Newburgh	Orange	2,080	HDD
Landfall 2 – Charles Point	136.7	Peekskill	Westchester	2,960	HDD
Landfall 3 – Croton Point	146.6	Croton-on-Hudson	Westchester	2,600	HDD
Landfall 4 – Randall's Island West	173.9	New York	New York	1,800	HDD
Landfall 5/6 – East River	174.8	New York	New York / Queens	2,220	HDD

4.7.7.1 Freshwater Wetlands Potential Impacts and Proposed Mitigation

The terrestrial transmission line corridor crosses approximately 15.6 miles of delineated freshwater wetlands. Based on a typical and anticipated 50-ft-wide (15-m-wide) construction corridor through wetlands, up to approximately 86.0 acres of wetlands could be temporarily disturbed during construction of the transmission line (the Applicant will refine the width of the construction corridor through wetlands during final design and include updated impact calculations, as necessary, in the EM&CP). Wetland community type impacts include the following: palustrine emergent: 49.0 acres; palustrine scrub/shrub: 30.1 acres; palustrine forested: 5.0 acres; and palustrine unconsolidated bottom: 1.2 acre. The Applicant anticipates that the total temporary wetland disturbance area will ultimately be less than 86.0 acres through a combination of trenchless crossings of some wetlands and micro-siting of the transmission line centerline within the certificated corridor. Revised wetland impact calculations will be provided in the EM&CP.

At this time, Project design includes the preliminary locations of construction access roads; however, final access road design is not complete. The Applicant plans to use existing access roads to the maximum extent possible which will limit any impacts to wetlands. Additional details will be provided in the EM&CP.

The terrestrial transmission corridor crosses approximately 1.4 miles of 21 wetlands which are potentially State-regulated wetlands. Based on a typical and anticipated 50-ft-wide (15-m-wide) construction corridor, up to approximately 8.6 acres of State-regulated wetlands could be temporarily disturbed during construction of the transmission line. State-regulated wetland community type impacts include the following: palustrine emergent: 2.4 acres; and palustrine scrub/shrub: 6.2 acres. No State-regulated forested wetlands are crossed within the terrestrial transmission line corridor, nor are any Class 1 wetlands. There are 15 crossings of Class 2 wetlands for 0.9 miles with a potential disturbance area of 5.5 acres. The Applicant anticipates that the total temporary wetland disturbance area within state-regulated wetlands will ultimately be less than 8.5 acres through a combination of trenchless crossings of some state-regulated wetlands and micro-siting of the transmission line centerline within the certificated corridor. Revised wetland impact calculations will be provided in the EM&CP.

Emergent wetland vegetation is expected to return quickly following construction, and woody species will return more slowly. Forested and scrub/shrub wetlands, where not maintained, are expected to go through several stages of successional vegetation before returning to the pre-construction vegetation cover type.

Surface and subsurface soil disturbance associated with installation of the transmission line in wetlands will temporarily alter soil profiles. The degree to which wetland soils would be impacted is variable depending on site-specific conditions present at the time of construction, including water levels/depths, the degree of soil saturation, and/or the bearing capacity of the soils. Other construction activities causing ground disturbance within, and adjacent to, wetlands may also result in temporary, localized changes to surface runoff and stormwater sheet flow patterns that may temporarily modify wetland hydrology. These changes will modify localized infiltration and percolation patterns and surface water contributions to, or discharges from, wetlands but such changes will be temporary with implementation of the BMPs summarized below.

Protective measures will be implemented during construction to avoid and minimize impacts to wetlands, as briefly summarized below. All wetland protective measures will be documented in the Applicant's SWPPP and EM&CP.

In locations where open trenching in wetlands occurs, the top 1 ft of topsoil will be segregated to the extent possible. Immediately after backfilling open trenches, segregated topsoil will be returned to its original location. Doing so will facilitate wetland revegetation by maintaining local surface soil physical and chemical characteristics and replacing the local native seed bank. In addition, backfilling trenches followed

by grading to pre-construction contours will occur according to BMPs. This will be accomplished to maintain the overall extent of affected wetlands as well as their original site hydrology and flow circulation.

The Applicant will avoid storing spoil within wetlands to the extent possible. Limited spoil storage may occur in wetlands where there are spatial constraints along the construction corridor such as in the vicinities of railroad and NYSDOT ROWs. In these areas, soil will be temporarily stockpiled on construction matting or geo-textile fabric. Any excess spoil will be removed from the ROW and disposed of properly off-site.

Generally, methods for minimizing short-term and temporary surface impacts to wetlands during construction include the implementation of vehicle and equipment exclusion fencing, erosion and sedimentation control measures, temporary construction matting, and implementation of the SWPPP included in the Project EM&CP. Erosion control barriers will be installed and maintained between upland construction areas and wetlands, as necessary, to prevent sedimentation into wetlands. Exposed soils will be planted and/or seeded to prevent soil erosion and sedimentation in nearby wetlands and surface waters from stormwater runoff.

As discussed in Section 4.1.4.4, cable joints and splices will be required along portions of the terrestrial transmission line, generally spaced approximately 2,000 ft apart, although distances will vary based on site-specific conditions; including cable pulling calculations, topography, available space, site access and conditions along the construction corridor, proximity to trenchless installations, and impact minimization measures. Installation of splice pits in unpaved areas will involve excavation of a pit that is approximately 30 ft long by 8 ft wide and approximately 8-10 ft deep with installation of concrete slabs at the bottom of each pit (see Sketch 5.1.300 in **Exhibit 5: Design Drawings)**. Cable ends are then pulled on the slab and a mobile splicing/jointing container is hoisted over the cables providing a safe consistent work environment for the cable jointing. When splicing/jointing works are complete, the container is removed from the location and the pit is backfilled around the cable with thermally and environmentally acceptable backfill. The Applicant will attempt to place all cable splices outside of wetlands to the extent practicable. However, if cable splices must be placed in wetlands, appropriate measures will be implemented to avoid permanent impacts to wetlands. Stockpiled suitable native wetland soil will be used for subsoil and topsoil backfill over the splice pits during restoration activities in wetlands. Doing so will facilitate wetland revegetation by maintaining local surface soil physical and chemical characteristics and replacing the local native seed bank. In addition, backfilling of splice pits and/or vaults will be followed by grading to pre-construction contours according to BMPs. This will be accomplished to maintain the overall extent of affected wetlands as well as their original site hydrology and flow circulation.

At other locations where the transmission line is installed under roads and other paved surfaces that are either in, or adjacent to, wetland areas, reinforced concrete manhole type splice vaults may be installed to house the cable joints as required. Works at vaulted installations will be like those of the direct buried splice pits except that the cables will be pulled into the vaults instead of onto a slab, and the joints will be applied inside the vault instead of the container environment. When splicing/jointing works are completed, the remaining backfill is applied around the vault and the wetland surface is restored to match pre-construction site conditions. At vault locations, only manhole covers will remain visible at the wetland surface. Sketch 5.1.300 and Sketch 5.1.302 in **Exhibit 5** show typical cross-sectional sketches of the manhole type splice vaults for HVDC and HVAC cables, respectively.

Both converter stations are sited exclusively in upland areas and will not result in impacts to wetland resources.

Prior to construction, the Applicant will obtain all required permits for activities in wetlands, including from USACE under Section 404 of the CWA. Mitigation for impacts to wetlands will be determined during the Section 404 permit application process in consultation with USACE and with NYSDEC during the Article VII certification process.

4.7.7.2 Tidal Wetlands Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.3, the terrestrial corridor on Croton Point is located within the 500-ft check zone of freshwater tidal wetland W-T28-039 (NYSDEC Wetland ID H-6). However, no portion of the regulated adjacent area of this wetland is within the proposed terrestrial project corridor (the corridor for the HDD for Landfall #3 does pass within the adjacent area, but no surface disturbance will occur in this segment of the project corridor).

As discussed in Section 4.7.3, the submarine corridor crosses approximately 5.2 miles of littoral zone tidal wetlands, and due to the very narrow strips of littoral zone tidal wetlands crossed, they only cover approximately 7.3 acres of the proposed submarine corridor. No NYSDEC-mapped tidal wetlands categorized as coastal fresh marsh; intertidal marsh; coastal shoals, bars and flats; or high marsh or salt meadow are crossed. At landfalls within the Hudson, Harlem, and East Rivers, the transmission line will be installed using HDD under littoral zone tidal wetlands in areas shallower than 6 ft (1.8 m) MLW. Project-related sediment disturbance in tidally influenced waterways would occur in waters deeper than 6 ft (1.8 m) MLW, outside of any tidal wetlands.

As discussed in Section 4.8.4, preliminary Project-specific modeling has been conducted to estimate potential total suspended solids (TSS) concentrations down current of the Project's in-water construction activities. The preliminary modeling results indicate the possibility of increased TSS in the littoral zone in or near the submarine corridor, depending on final route alignment and burial depth. The modeling will be revised following completion of a Project-specific sediment survey. If the revised modeling indicates that New York water quality standards may be exceeded within tidal wetlands, the Applicant will evaluate measures to reduce concentrations to the extent practicable and/or request a regulatory mixing zone to comply with New York water quality standards. Consequently, no adverse impacts to tidal wetlands are expected because of the Project.

4.7.7.3 Watersheds Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.4.1, the terrestrial transmission line corridor crosses five separate Class AAs watersheds (HUC level 12), with most of the crossings occurring in the New York City Watershed. Furthermore, there are 34 delineated streams within the portion of the corridor that crosses the New York City Watershed (see Attachment 5). The closest steam crossing to a reservoir occurs 2.5 miles upstream of Pepacton Reservoir as the corridor crosses an unnamed tributary to Bryden Hill Brook.

The Applicant understands that NYSDEC may require an Individual SPDES permit (per 6 NYCRR § 750-1.21(e)(1)(i)) for crossings that are in AA or AA-s watersheds and crossings of tributaries to AA or AA-s watershed. The Applicant will consult with NYSDEC to determine which portions of the Project area are eligible for an SPDES General Permit and which portions may require an Individual SPDES permit. The Applicant will also continue to coordinate with NYCDEP to ensure agreement and compliance regarding watershed crossings. Crossings of the Class AAs watersheds and the streams within the watersheds will be accomplished using methods for avoiding and minimizing impacts to the streams as well as to areas downstream of the crossings, in accordance with the Project's SWPPP which will be included in the EM&CP.

The transmission line corridor crosses the West Delaware Aqueduct and the Catskill Aqueduct (see Figure 4-4 in Attachment 1 to this Exhibit). Based on review of various online information, the aqueducts appear to range in depth from 300 ft (91 m) to 1,550 ft (472 m) below ground surface (Hofstra 2022; NYCDEP 2022; Catskill Archive 2022). Such depths would eliminate any potential direct impacts to the aqueducts from excavation of the approximately 5-foot-deep trench for the proposed transmission line. The Applicant will continue to consult with NYCDEP during Project design to identify any crossing-specific avoidance and minimization measures to ensure the integrity of the aqueducts are not affected. Crossing plans for these aqueducts will be included in the EM&CP.

4.7.7.4 Stream and Riverine Resources Potential Impacts and Proposed Mitigation

As noted in Section 4.7.4.2, the terrestrial transmission line corridor crosses 134 perennial, 78 intermittent, and 19 ephemeral streams. Of these, there are 199 minor stream crossings, 29 intermediate stream crossings, and 3 major stream crossings. Minor stream crossings, which represent 86% of all stream crossings, range from 1 ft to 10 ft (0.3 to 3 m). Combining all the minor stream widths provides an estimated average crossing width of 3 ft (1 m). Intermediate streams crossed by the terrestrial corridor range in width from 13 to 80 ft (4 to 24 m). The average width for intermittent stream crossings is 29 ft (9 m). The widths of major streams range from 105 to 250 ft (32 to 76 m), with an average of 177 ft (54 m).

As shown in Table 4-12, the Applicant has currently identified eight stream and two waterbody crossings where trenchless methods are the preferred crossing technique: the West Branch Delaware River, East Branch Delaware River, Beaver Kill, Mongaup River, Neversink River, Basher Kill, Monhagen Brook, and Wallkill River. The Applicant is in the process of consulting with NYSDEC regarding crossing methods for all State-regulated streams and wetlands within the Project area. The Applicant is also in the process of conducting and reviewing results of geotechnical investigations to assess the feasibility of trenchless crossings at numerous locations. The Final proposed crossing methods for all resources will be included in the EM&CP.

Potential impacts to streams from construction of the transmission line include potential for increased turbidity, higher sedimentation rates in downstream areas, changes in water quality (including reduced clarity in the water column, altered water chemistry, and changes in biochemical oxygen demand and pH), the introduction of drilling fluids as a result of inadvertent return from trenchless crossings, removal of in-stream aquatic and emergent vegetation, short-term and localized avoidance of the construction area by fish and other mobile aquatic organisms, and potential for loss of aquatic organisms that are less mobile or tend to stay in one place. Selection of appropriate crossing methods and the implementation of safeguards and BMPs in the vicinity of stream and river crossings will support avoidance and minimization of these impacts. Crossing methods for reducing impacts include open trenching under no flow/low flow steam conditions, dry ditching by diverting flows around construction areas to downstream locations, and trenchless methods such as HDD and jack and bore. Dry-ditch crossings can be completed quickly, typically less than 24 hours, which would result in short-term duration of construction and minimal impacts to minor streams. Trenchless methods avoid contact with streams by tunneling the transmission line below streambeds.

BMPs will include installation of erosion barriers along riparian corridors and between upland areas and streams. Vegetation clearing along stream banks will be limited to what is minimally required for construction. Soils and stream substrates will be stockpiled in locations away from streams to reduce the potential for sediment loading during rainfall events.

Staging and refueling of equipment, machinery, and vehicles will be set back from streams in accordance with required buffers identified through the permitting process. The Applicant's Spill Prevention Control and Countermeasures Plan, which will be included in the EM&CP, will describe measures to prevent and control adverse impacts and contamination due to spills and releases of hydraulic fluids, fuel, and other fluids. The Applicant will also prepare an Inadvertent Return Contingency Plan to address the inadvertent return of drilling fluids; the plan will be included in the EM&CP.

4.7.7.5 Groundwater Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.3, groundwater may be encountered during construction along portions of the terrestrial transmission line, particularly at wetland crossings where such crossings occur during the winter or spring months. If groundwater is encountered during construction, the Applicant will use appropriate BMPs to protect groundwater quality. For example, the transmission line trench may be plugged and dewatered as needed, and any groundwater encountered during construction will be discharged to well-vegetated upland areas, located well-away from mapped wetlands/streams/waterbodies to prevent any potential discharge and/or contamination, using properly constructed dewatering structures and/or geotextile sediment filter bags. Installation of French drains in the construction trench may also be used to facilitate drainage in addition to temporary settling ponds that may be constructed in upland areas as needed to discharge pumped trench water/groundwater for discharge through filter bags for further distillation. Groundwater is not expected to be encountered during construction at the northern and southern converter station sites due to the upland conditions of the sites and the Project's planned construction requirements. Any collection, pumping, or discharge of groundwater will be discussed in detail in the Project's SWPPP.

Trenchless installation methods for the transmission line, particularly HDD, will involve drilling greater than 20 ft (6.1 m) below the ground surface and in many cases through groundwater zones. The HDD installation method requires HDD drilling fluid, which typically consists of a water and bentonite mixture. For the protection of groundwater resources, any excess drilling fluid will be contained in a lined pit or containment pond, or trailer mounted portable tank, avoiding percolation to, and therefore contact with, groundwater. The bentonite mixture is made up of mainly inert, non-toxic clays and rock particles consisting predominantly of clay with quartz, feldspars, and accessory material such as calcite and gypsum; the mixture is not anticipated to significantly affect groundwater quality if released. An inadvertent return/release can occur when the drilling fluids migrate unpredictably to the land through fractures, fissures, or other conduits in the underlying rock or unconsolidated sediments. An inadvertent return/release could potentially increase turbidity in groundwater resources. Should an inadvertent return/release occur, it would likely only result in short-term and localized impacts. Finally, while subsurface disturbance via HDD will impact soils and other subsurface materials, groundwater would not be expected to be altered to a degree that would cause permanent diversion or compaction affecting the percolation of water.

The Applicant will implement measures to avoid and minimize the potential for construction activities to introduce pollutants to groundwater from the accidental discharge of petroleum or other chemicals. Such discharges could occur in the form of minor leaks from fuel and hydraulic systems, as well as more substantial spills that could occur during refueling or due to mechanical failures of construction equipment and other accidents. These risks will be minimized by measures like requiring the storage of all potential construction pollutants or contaminants in industry approved storage containers with 110% storage capacity and located in confined and lined storage locations at required setback distances from sensitive resources. Adherence to the Project's SPCC, SWPPP and EM&CP will further avoid and minimize potential impacts to groundwater from accidental discharges.

Blasting of shallow rock and bedrock may be required at some locations along the terrestrial transmission line. However, the proposed shallow installation design of 5 ft (1.5 m) for the transmission line, and potentially shallower installation in areas of shallower bedrock as discussed in **Exhibit 5**, will greatly

minimize the amount of blasting and bedrock/rock removal that is required along the corridor. In addition, the transmission line will be sited within the corridor to avoid shallow bedrock and rock outcropping areas to the greatest extent possible. Where blasting is required, groundwater flow in the immediate vicinity could be temporarily altered and there may be a short-term increase in groundwater turbidity. Blasting activities will be performed by a licensed professional adhering to strict guidelines to control energy release to the extent practicable. Charges for blasting will be kept to the minimum required to break up rock and bedrock. Where appropriate, mats made of heavy steel mesh or other comparable material, or trench spoil will be used to prevent scattering of rock and debris that result from blasting operations. The risk of disrupting and/or contaminating groundwater resources during construction blasting will be minimized by clearly flagging all mapped seeps and springs in the construction corridor and identifying the location of all shallow aquifers and/or groundwater wells (private and public) within 300 ft (91 m) of any planned blasting activities along the transmission line. Blasting activities will adhere to all industry standards relevant to controlled blasting and blast vibration limits.

As discussed in Section 4.7.3, 21 seeps and springs were identified within the terrestrial transmission line corridor in Sullivan and Delaware Counties (see Figure 6 of Appendix H to this Exhibit). The Applicant will make every practicable attempt to avoid direct impacts to seeps and springs during final engineering design of the transmission line route and workspace. If any seeps or springs cannot be directly avoided, specialized BMPs articulated in the Project SWPPP and EM&CP will be developed to maintain water flow and protect water quality. In areas of known groundwater resources, the Applicant will contact abutting landowners to identify any known seeps, springs, both within the construction corridor itself, as well as within 50 ft of any planned construction activities. Similarly, the Applicant will identify the location of any private wells within 50 ft (15.2 m) of the construction workspace by contacting abutting landowners and will employ measures to protect them as well. Such measures may include centerline adjustments within the proposed corridor, workspace neckdowns, and well monitoring during construction. The locations of wells and all seeps or springs used for drinking water along with sediment and erosion control protection measures which will be identified in the SWPPP and EM&CP.

Site restoration techniques, including those for soil compaction, will prevent localized impacts to groundwater recharge and permeability characteristics. Consequently, groundwater volume will not be affected by the Project.

During operations, the converter stations will contain oils, fuels, and/or lubricants. However, as the equipment will be mounted on foundations with associated secondary oil containment or located within buildings, an inadvertent release of oil at these facilities is not expected to impact the quality of the underlying groundwater. The Applicant will prepare an SPCC plan for the converter stations detailing spill prevention, control, and containment which will be included in the EM&CP.

4.7.7.6 Floodplains Potential Impacts and Proposed Mitigation

As discussed in Section 4.7.4, the terrestrial transmission line corridor crosses approximately 4.4 miles of SFHAs almost all of which are Zones A and AE (Zone VE, coastal floodplain, is crossed for 105 ft [32 m]). Based on a typical and anticipated 50-ft-wide (12-m-wide) construction corridor, up to approximately 26.6 acres of SFHAs could be temporarily disturbed during construction of the transmission line. Transmission line construction activities in floodplains may include vegetation clearing, movement of equipment, trenching, and restoration. Since the transmission line will be installed underground and all disturbed areas will be revegetated, there will be no impacts to flood storage capacity in the FEMA mapped floodplain areas The Applicant will attempt to install all cable splices along the transmission line outside of SFHAs. However, if any cable splices are placed in floodplains the minimal footprint of the underground infrastructure (i.e., concrete slabs or vaults) will have no effect on flood storage either.

Approximately 0.4 acres of the southern converter station site is within SFHE Zone AE. Based on a flood zone evaluation completed by the Applicant, the design flood elevation is higher than the current grade at the site. Consequently, the site will either require site grading to raise the pad elevation to meet all applicable codes and regulations, or the design will need to include raised structures/floors. The design of the southern converter station will address New York City flood-resistant construction standards. Additional design details including flood hazard mitigation measures will be provided in the EM&CP.

Development within floodplains in New York State is governed by the requirements of local municipalities (e.g., town, city, or village) that participate in the National Flood Insurance Program. All construction proposed within SFHAs is subject to floodplain development regulations. Additional information on local ordinances, including those associated with floodplain development, and their applicability to the Project is provided in **Exhibit 7: Local Ordinances**.

4.8 Marine Physical and Chemical Conditions

This section describes the physical and chemical characteristics of the marine environment in and near the proposed transmission line corridor and potential Project impacts on these aspects of the marine environment. This section also describes measures that the Applicant will implement to avoid, minimize, and/or mitigate potential impacts of the Project on the physical and chemical characteristics of the marine environment. This section addresses the requirements of 16 NYCRR § 86.5(b) with respect to identifying Project-related changes in hydrology, topography (i.e., bathymetry), and soil (i.e., sediment) along the submarine portion of the proposed transmission line corridor.

For this Exhibit, the terms “marine” and “submarine” refer to the tidally influenced waterbodies crossed by the Project’s proposed transmission line corridor. The proposed transmission line corridor crosses a total of 47 miles of tidally influenced sections of the Hudson (south of Newburgh), Harlem and East Rivers, including Spuyten Duyvil Creek, which connects the Hudson and Harlem Rivers. These waterbodies are part of the larger Hudson River tidal estuary that extends from its confluence with Upper New York Bay to the Federal Dam at Troy, New York (Yozzo et al. 2005).

The waterbodies crossed by the submarine corridor are classified and regulated in accordance with several of the federal and state programs discussed in Section 4.7, including Section 401 and 404 of the CWA, Section 10 of the RHA, Article VII of the PSL, and 6 NYCRR Parts 701 and 703. Additionally, the marine waterbodies crossed by the submarine corridor require approval from USACE under Section 14 of the RHA (commonly known as Section 408 approval) for permanent or temporary actions that build upon, alter, improve, move, occupy, or otherwise could affect an authorized USACE Civil Works projects such as a federally authorized navigation channel. Further, excavation and fill activities within the submarine corridor, including trenching, are regulated under the Article 15 of the ECL, Protection of Waters Program, as implemented through the Article VII process. A utility easement must be obtained from the NYSOGS to use state-owned lands under water pursuant to the provisions of Section 3, Subdivision 2 of the New York State Public Lands Law.

4.8.1 Marine Physical and Chemical Conditions Studies and Analysis

Marine physical and chemical characteristics in and near the Project area were assessed based on a desktop analysis of publicly available data and literature, supplemented by Project-specific in-water surveys. The following are some key literature and database sources used to identify physical and chemical conditions in and near the submarine portions of the proposed transmission line corridor in the Hudson, Harlem, and East Rivers.

- USGS National Water Information System (multiple stations).
- NOAA Tides and Currents online database (multiple stations)
- NYCDEP New York/New Jersey Harbor Estuary Program monitoring (NYCDEP 2021)
- Harbor-Wide Water Quality Monitoring Report (NY/NJ HEP 2021).
- The Benthic Mapping Project supported by the NYSDEC Hudson River Estuary Program (Bell et al. 2010).
- The 2010 CHPE project Marine Survey Report (HDR-DTA 2010a).
- NYSDEC Contaminant Assessment and Reduction Project (CARP) sampling results (Litten 2003; Lodge et al. 2009; HDR-DTA 2010b, Fisher 2016).
- U.S. Environmental Protection Agency (EPA) Regional Environmental Monitoring and Assessment Program (REMAP) sampling results (Mueller and Estabrooks 2006; Fisher 2016).

Between December 2021 and July 2022, the Applicant conducted a Project-specific geophysical (i.e., remote sensing) survey of the proposed submarine transmission line corridor. These results are reflected in the following discussion on bathymetry (bottom topography) along the proposed submarine corridor.

In June/July 2022, the Applicant conducted a Project-specific benthic survey to characterize the current benthic macroinvertebrate communities along the submarine portions of the proposed transmission line corridor. Surface sediment grain size and total organic carbon data were also collected at the benthic sampling stations, as reflected in the discussion under Section 4.8.2.5 on physical sediment characteristics. The biological aspects of the benthic community survey results are discussed further in Section 4.9. The complete results of the Project-specific benthic survey will be provided to the Commission as soon as they become available.

The Applicant is in the process of conducting a marine field survey to evaluate geotechnical and sediment chemistry conditions within the proposed submarine transmission line corridor. These results will be provided to the Commission as soon as they become available and the results of the survey will be instrumental to the final design which will be reflected in the EM&CP.

4.8.2 Existing Marine Physical Characteristics

4.8.2.1 Bathymetry

General bathymetric descriptions within the submarine transmission line corridor are provided in the following subsections for each river segment. Figure 4-5 (see Attachment 1 to this Exhibit) presents a map of bathymetric contours in and near the Project's proposed transmission line corridor. The descriptions are based on observations from the Project geophysical survey as well as review of public data within the riverways. The bathymetric and other geophysical conditions surveyed within the Project corridor will be further evaluated through planned assessments in connection with the final design and the preparation of the EM&CP to refine the submarine transmission line corridor and inform burial depth and cable protection designs.

Upper Hudson River Segment: From Newburgh to Peekskill

The northernmost submarine segment of the proposed submarine corridor extends from Newburgh (near River Mile [RM 62]) to Peekskill (near RM 42). Bathymetric conditions vary significantly within this approximately 20-mile stretch of the corridor. The orientation of the Hudson River, and thus the Project

corridor, is also variable within this section. There are multiple areas where the river bends around topographic features (e.g., West Point, Anthony's Nose, Jones Point).

Outside the proposed landfall areas, water depths in the proposed corridor range from approximately -40 ft to nearly -180 ft (-12 to -55 m) referenced to the 1988 North American Vertical Datum (NAVD88). The deepest conditions are located where the river bends sharply around West Point. Multiple other areas of deep scour hole-like features in the riverbed are also present around Little Stony Point, Mystery Point, Ft. Montgomery, Iona Island, and just north of Roa Hook.

Steep riverbed slopes and sharp features, such as exposed rock, appear mostly within and around the deep scour hole-like features and in areas along the riverbanks. Areas of potential sand ripple/wave formations have also been observed throughout the submarine corridor. Outside of these regions, slopes along the riverbed appear gradual.

Lower Hudson River Segment: From Croton Point to Harlem River Entrance

The proposed submarine corridor extends for another approximately 20-mile stretch through the Hudson River between Croton Point (near RM 34) and the Harlem River entrance at Spuyten Duyvil Creek (near RM 14). This section of riverway is relatively linear in a north-south direction, resulting in a Project corridor with few directional changes.

Water depths within the Project corridor predominantly range between -25 and -60 ft (-7.6 and -18.2 m) NAVD88 outside the landfall area at Croton Point. Riverbed slopes appear mostly gradual. This section does not appear to contain any significant natural riverbed features, such as deep scour holes or large rock outcrops. However, sand ripple/wave formations appear to be present throughout the corridor. Areas of localized disturbance to the riverbed are also visible around areas of human-made features, such as near the Mario Cuomo Bridge and a NOAA-charted pipeline near Dobbs Ferry.

Harlem River Segment

The proposed submarine corridor extends through the Harlem River for about 6 miles and is about the width of the riverway. The Harlem River is predominantly a federal navigation channel with an authorized depth of -15 ft (-4.6 m) mean lower low water (MLLW) vertical datum, except for a section near the Broadway Bridge that is authorized to -18 ft (-5.5 m) MLLW (USACE 2020). The orientation of the Harlem River and thus, the Project corridor, is nonlinear. The river bends as it abuts the northern shoreline of Manhattan.

Water depths within this section of the submarine corridor predominantly range from -20 to -30 ft (-6.1 to -9.1 m) NAVD88, with some isolated areas that are shallower or deeper. The riverbed surface is highly variable within this section due to numerous human-made and natural features such as bridge piers, existing utilities and infrastructure, and rock outcrops. Bathymetric features such as depressions, scour holes, and sand ripple/wave formations are visible throughout the riverbed. Potential debris, riprap, and infrastructure elements also appear to be exposed along the riverbed.

East River Segment

The proposed Project corridor extends approximately 1 mile across a section of the East River, between Randall's Island and Lawrence Point in Queens. This section of the East River includes a portion of the federal navigation channel with an authorized Project depth of -35 ft (-10.6 m) MLLW (USACE 2022).

Bathymetric conditions along the proposed East River crossing are highly variable—within the main river channel, water depths range from approximately -40 ft (-12.2 m) to -110 ft (-33.5 m) NAVD88. The riverbed contains a plateau-like feature in the center of the channel, which is bounded by deeper troughs along each side; the feature is labeled as "Middle Ground" on NOAA Chart 12339 (NOAA NOS 2021). Steep slopes are present along the riverbanks and along the sides of the center plateau feature. Potential rock outcrops are observed throughout this section of the corridor as well.

4.8.2.2 Tides and Currents

Hudson River

As noted above, the proposed transmission line corridor crosses sections of the Hudson, Harlem, and East Rivers that are part of a tidal estuary system. The Hudson River Estuary can be classified as a "drowned river valley, partially mixed, tidally dominated estuary" (Blumberg and Hellweger 2006). South of the federal dam at Troy, New York (RM 153.7), the Hudson River is subject to semi-diurnal tides, with two highs and two lows occurring over a 25-hour period (Yozzo et al. 2005; NOAA 2022a). The mean tidal range, measured as the difference between MLW and mean high water, is approximately 4.5 ft (1.5 m) at The Battery in Manhattan (RM 0.0) (NOAA 2012), which is approximately 14 miles south of the Hudson River's junction with the Harlem River at Spuyten Duyvil Creek. The mean tidal range is approximately 2.5 ft (0.76 m) at West Point (RM 51.6) (Cooper et al. 1988) and 3.8 ft (1.2 m) at Turkey Point (RM 98.5) (NOAA 2018). NOAA Chart 12343 indicates the mean tidal range is 2.8 ft (0.85 m) at Newburgh (RM 62) and is 2.9 ft (0.88 m) at Peekskill (near RM 42) (NOAA NOS 2022), both of which are near proposed Project landfall locations. Tidal ranges are partially a function of local river channel dimensions (de Vries and Weiss 1999). The dominant force of the tides typically causes the Lower Hudson River to reverse direction of flow four times a day. Total Hudson River flow rate was measured as high as 368,000 cubic ft per second (ft^3/s) at Croton Point (formerly Teller's Point) in August 1990 (de Vries and Weiss 2001), and peak total flows of approximately 300,000 ft^3/s were measured at USGS station (01372043) near Poughkeepsie in 2001, 2002, and 2003 (USGS 2022a).

Typically, the freshwater inputs are much lower than the total tidally influenced daily flow rates. For example, the annual mean daily discharge of the non-tidal (freshwater) input at the former USGS station (01372058) south of Poughkeepsie ranged from 17,700 ft^3/s to 27,700 ft^3/s during the period of 2004 to 2018 (USGS 2022b). However, the daily peak freshwater flow rates can be substantially greater; for example, annual peak freshwater flow rates near Poughkeepsie ranged from 60,400 ft^3/s to 240,000 ft^3/s between 2001 and 2019 (USGS 2022b). The freshwater flow varies seasonally, with the highest flows typically in the spring, following snow melt, and the lowest flows during late summer and early fall (Yozzo et al. 2005). This pattern is reflected in the monthly mean for freshwater discharges measured near Poughkeepsie during the period of April 1, 2002, to August 31, 2019 (see Figure 4-6 in Attachment 1 to this Exhibit). Two-thirds of the freshwater input enters from the upper Hudson River at the Troy dam, and the freshwater flow increases at a roughly linear rate south of the Troy dam due to tributaries along the river (Cooper et al. 1988). Tidally induced currents in the lower Hudson River typically reach approximately 2 knots (1 m/s) at the river surface (Levinton and Waldman 2006). For the 2022 calendar year, NOAA predicted surface velocities of up to 1.6 knots (0.8 m/s) at the Newburgh-Beacon Bridge, up to 1.7 knots (0.9 m/s) at West Point (off Duck Island), and up to 2.8 knots (1.4 m/s) at the Mario Cuomo Bridge (NOAA2022b, 2022c, 2022d). The freshwater contribution to flow velocities varies seasonally, from a low of approximately 0.02 knots (0.01 m/s) in the dry summer months to as much as 1 knot (0.5 m/s) during the spring thaw (Levinton and Waldman 2006). Flows are typically faster during spring tides compared to neap tides, and typically faster during the ebb (outgoing) cycle compared to the flood (incoming) cycle.

Harlem River and East River

The Harlem River and East River are tidal straits that also experience diurnal tidal shifts. The mean tidal range in the Harlem River at Randall's Island is 4.6 ft (1.4 m) (NOAA 2014). In contrast, the mean tidal range in the East River at Port Morris (Stony Point), just north of the proposed Project corridor, is 6.2 ft (1.9 m) (NOAA 2004). The currents in the Harlem River and East River are tidally driven with some freshwater contribution from the Hudson, as well as sewage and stormwater outflows from the adjacent boroughs (Levinton and Waldman 2006; Blumberg and Pritchard 1997). Results from an 18-month (1988 to 1989) simulation indicate that flows through the Harlem River oscillate between approximately 5,100 ft^3/s towards the Hudson River to 1,350 ft^3/s towards East River, with a net flow of approximately 900 ft^3/s towards the Hudson River. Flows in the East River near Randall's Island are complex due to vertical stratification where an average surface flow of approximately 7,000 ft^3/s is directed north towards Long Island Sound, while an average bottom flow of approximately 15,400 ft^3/s is directed south towards Upper New York Bay (Blumberg and Pritchard 1997). This yields a net flow of approximately 8,400 ft^3/s towards Upper New York Bay, although peak flows of up to 40,500 ft^3/s have been estimated during winter (Blumberg and Pritchard 1997). According to NOAA, peak water velocities in the Harlem River near Macombs Dam Bridge are predicted to reach up to 2.3 knots (1.2 m/s) (NOAA 2022e), while the Davidson Laboratory Urban Ocean Observatory predicts surface currents at this location will regularly reach 3.5 knots (1.8 m/s) (Stevens Institute of Technology 2022). Currents regularly exceed 4 knots (2.0 m/s) within the East River along the eastern side of Randall's Island and often exceed 5 knots (2.6 m/s) between Horn's Hook and Hell Gate, south of Randall's Island (NOAA 2022f; Levinton and Waldman 2006; Stevens Institute of Technology 2022). These strong currents are driven by the substantial differences in amplitude and timing of the tides in New York Harbor compared to Long Island Sound and, to a lesser degree, periods of sustained winds (Levinton and Waldman 2006).

4.8.2.3 Sea Level

Based on NOAA's Tides & Currents database, relative sea level measured at The Battery in New York City has risen an average of 0.12 inches per year (2.9 millimeters per year) between 1856 and 2021, or approximately 11.4 inches per century (NOAA n.d.). NOAA's observation-based extrapolation for sea level rise in the Northeast U.S. ranges from 11.2 inches (0.30 m) to 17.5 inches (0.47 m) between 2000 and 2050 (NOAA 2022g) (i.e., at least twice as fast as the observed average through 2021). Intermediate- to high-level emission scenarios are expected to increase the range to between 12.6 inches (0.34 m) and 25.7 inches (0.69 m) of sea level rise in the region over the 50-year period (NOAA 2022g). In comparison, 6 NYCRR Part 490 identifies a projected sea level rise ranging from a low of 8 inches to a high of 30 inches between 2000 and the 2050s for New York City and the Lower Hudson Region based on the ClimAID model (i.e., global climate models downscaled to New York). The middle-range scenarios (25^{th} percentile to 75^{th} percentile) range from 11 inches to 21 inches (0.28 m to 0.53 m). This indicates that 75% of the modeled scenarios resulted in at least 11 inches of sea level rise, and that 25% of the modeled scenarios resulted in at least 21 inches of sea level rise. The New York City Climate Resiliency Design Guidelines version 4.0 present sea level rise predictions consistent with 6 NYCRR Part 490 and indicates that facilities should account for a 16-inch sea level rise through the 2050s (NYC 2020).

Future predictions of potential sea level rise over the lifespan of the Project have been considered in the design basis for the Project facilities, including the southern converter elevation, which has assumed a 2 ft (0.6 m) sea level rise over the lifespan of the Project. Extreme weather events, such as tropical storms and hurricanes, have historically caused storm surges along coastal New York. Most recently (2012), Hurricane Sandy created a storm surge higher than a 100-year storm model. Storm surges during Hurricane Sandy reached heights up to 11 ft (3.5 m) relative to mean sea level. Additional discussion of floodplains relative to the onshore Project components is provided in Section 4.7.6.

4.8.2.4 Salinity and Water Temperature

Hudson River

Variations in temperature and salinity are important to the physical, chemical, and biological processes within the Hudson River Estuary (Cooper et al. 1988). The Hudson River Estuary can be divided into four salinity zones: polyhaline (18 to 30 parts per thousand [ppt]), mesohaline (5 to 18 ppt), oligohaline (0.3 to 5 ppt), and limnetic (less than 0.3 ppt) (Cooper et al. 1988; Levinton and Waldman 2006). The boundaries of these salinity zones within the Hudson River Estuary shift daily and seasonally based on several hydrographic factors, primarily the tidal surge of saline water upriver from the ocean and the amount of freshwater flow into the estuary (Cooper et al. 1988; Levinton and Waldman 2006). In the lower reaches of the Hudson River, generally south of Poughkeepsie, a two-layer vertical stratification is often present, where higher salinity waters are overlain by lower density freshwater. The stratification is more pronounced when freshwater flow is high and tidal amplitude is low (e.g., neap tides). When freshwater flow is low and/or tidal amplitude is high (e.g., spring tides), vertical mixing increases and greatly reduces the stratification (Cooper et al. 1988). Vertical salinity stratification drives an estuarine circulation pattern whereby denser, higher-salinity water near the bottom flows upriver while lower-salinity water near the surface flows downriver (Levinton and Waldman 2006; Blumberg and Hellweger 2006). The stratification is typically more pronounced south of Haverstraw Bay; within Haverstraw Bay and north to approximately Iona Island (RM 47) a series of sills promotes vertical mixing and reduces stratification (Cooper et al. 1988).

Historically during typical weather years, the salt front (defined as a salinity level of 0.1 ppt) has ranged from approximately New Hamburg (RM 67.7) to Hastings-on-Hudson at RM 21.5 (de Vries and Weiss 2001). During average seasonal conditions the salt front reaches the northern end of the submarine corridor at Newburgh (RM 62) by late summer/early fall when freshwater inputs are low (Yozzo et al. 2005; de Vries and Weiss 2001). During periods of high freshwater flow, usually during spring, the salt front may be pushed downriver as far as the Bronx (near RM 15), at least at the surface; a denser tidal "salt wedge" maintains higher salinities in the lower water column during periods of greater freshwater discharge, particularly during neap tides when vertical mixing is not as pronounced (Yozzo et al. 2005; Blumberg and Hellweger 2006; Levinton and Waldman 2006; Stevens Institute of Technology 2022). Other environmental and anthropogenic activities can also influence the salt front. Deeper estuaries typically allow the salt front to extend further upriver in the lower water column and regulated releases from dams can push the salt front downriver (Ralston and Geyer 2019, Hoagland et al. 2020). During drought years, the salt front has been observed to extend as far north as Poughkeepsie (RM 75) (de Vries et al. 2001; Blumberg and Hellweger 2006).

The southern limit of the oligohaline zone (i.e., salinities of up to 5 ppt) may shift between RM 25 and RM 12 near the surface (Cooper et al. 1988; Stevens Institute of Technology 2022). Mesohaline conditions are typically present south of RM 28 (near Tarrytown) down to The Battery (RM 0) (Cooper et al. 1988) but salinities of up to approximately 8 ppt have been measured as far north as West Point during the period between 1991 and 2014 (USGS 2022c). Polyhaline conditions (i.e., greater than 18 ppt) occur in the Hudson River south of approximately the Harlem River (near RM 14); these higher salinity conditions are more persistent in the lower water column but can also be present at the surface south of the George Washington Bridge during summer months, near the southern end of the proposed Project corridor (Stevens Institute of Technology 2022).

Between October 1991 and September 2014, daily surface water temperatures were measured at West Point, NY (USGS Station 01374019); the warmest temperature measured during this period was 29.0 C for three days in August 2005 (USGS 2022c). Surface water temperature measurements were also collected in the Hudson River at the former USGS station (01372058) south of Poughkeepsie between May 1992 and November 2019; the data for this period indicated a maximum surface water temperature of 29.0 °C in August

2005, corresponding to the measurements at West Point (USGS 2022b). More recently (August 2019 to August 2022), daily surface water temperatures were measured in the Hudson River near Poughkeepsie (USGS Station 01372043); the warmest temperatures in each year ranged from 26.6 to 34.4 °C in July/August (USGS 2022d). The USGS datasets for West Point and Poughkeepsie referenced above indicated lowest annual surface water temperatures ranging from -0.2 to 0.2 °C in January/February. In winter, ice may completely cover the surface of the Hudson as far south as Peekskill, although it is broken up by ship traffic and tidal action (Cooper et al. 1988). In the spring and summer, river temperatures typically increase from south to north, when the incoming sea water is cooler than the freshwater inputs; this reverses in the late fall and winter, when the freshwater discharge is cooler than seawater (Cooper et al. 1988). However, large freshwater discharges, typically in the spring and fall, can have an overall cooling effect on the river. Annual mean water temperatures ranged from 11.3 to 14.3 °C for the period of 1946 to 2012 based on data measured at the Poughkeepsie Water Treatment Facility and three USGS survey sites (below Poughkeepsie [01372058, South Dock at West Point [01374019], and south of Hastings on Hudson [01376304] (Seekell and Pace 2011). These annual data suggest a trend of increasing average river temperature (see Figure 4-7 in Attachment 1 to this Exhibit), generally consistent with a study of the Hudson River temperature data at Poughkeepsie between 1920 and 1990 (Ashizawa and Cole 1994). The New York/New Jersey Harbor and Estuary Program (NY/NJ HEP) (2021) notes that this trend is detrimental in terms of environmental health of the estuary.

Harlem River

Salinity in the Harlem River varies greatly with the tidal cycle. Salinity measurements were taken by the USGS every 15 minutes in the Harlem River at Mill Pond Park between January and September 2021; the results ranged from 3.0 ppt (July) to 26.5 ppt (February) (USGS 2022e). From one tidal cycle to the next, the salinity often changed by more than 10 ppt, where the flood current brought in higher salinity waters from East River and the ebb current carried in lower salinity waters from the Hudson River (via Spuyten Duyvil Creek). Water temperature at this location during the same period in 2021 ranged from 0.5 °C (February) to 26.6 °C (August) (USGS 2022e). The Davidson Laboratory Urban Ocean Observatory predicted somewhat larger salinity gradients at a similar location in the Harlem River for the same period (i.e., changes of over 15 ppt between some ebb and flood tides); the model also indicated a temporary but significant difference between surface (less saline) and bottom (more saline) conditions during the ebb tide during periods that likely had greater freshwater inputs from the Hudson River (e.g., in April and May) (Stevens Institute of Technology 2022) At other times, there was no significant difference predicted between surface and bottom salinities in the Harlem River over the course of several tidal cycles, and little to no difference between surface and bottom temperatures was predicted during any season.

Records of salinity and temperature data dating back to 1914 has been collected at the Macombs Dam Bridge in the Harlem River by NYCDEP (Fisher 2016). For measurements between 1914 and 2011, average salinity of the surface and bottom of the Harlem River was 19.6 ppt and 20.2 ppt, respectively. Salinity ranged between a low of 0.4 ppt and a high of 35.0 ppt over this period. Temperature measured at this site between 1914 and 2011 ranged from 0.2 °C to 29.4 °C with a mean surface and bottom temperature of 21.1 °C and 20.8 °C, respectively. This confirms that there is little difference between surface and bottom salinity and temperature conditions on average; however, the data was more frequently collected during summer and fall (June through September), so the average water temperature for an entire year can be expected to be lower. More recently (January 2017 to August 2021), salinity measured at Macombs Dam Bridge has ranged from a low of 4.8 ppt to a high of 25.1 ppt, with an average of less than 0.4 ppt difference between surface and bottom measurements (NYCDEP 2021). During the 2017 to 2021 period, temperature measurements ranged from 1.4 °C (January 2018) to 27.3 °C (August 2018) at Macombs Dam Bridge, with negligible average difference between surface and bottom temperatures (NYCDEP 2021).

East River

Salinity in the East River is less variable than the Harlem River, as the main influences are the higher salinity inputs from Long Island Sound and Upper New York Bay. A salinity gradient along the bottom of the East River extends from Western Long Island Sound that is on average 4 ppt higher than the bottom waters of the rest of New York Harbor (Levinton and Waldman 2006). The strong tidal currents in East River, discussed above, maintain a well-mixed water column with little vertical salinity stratification in the vicinity of Randall's Island (Levinton and Waldman 2006). However, there are periodic drops in salinity during flood tides that are more pronounced at the surface when freshwater inputs from the Hudson River (and other rivers in the region) are elevated (Stevens Institute of Technology 2022). This occurs because currents in the East River are directed towards Long Island Sound during a flood tide, allowing lower salinity waters to enter via the Harlem River and Upper New York Bay.

NYCDEP has monitored water conditions of East River at Hell Gate for many years, with records for salinity dating back to 1919 (NYCDEP 2021). For relative comparison with Harlem River data above, results for salinity and temperature were considered for the period between January 2017 and August 2021. During this time, salinity ranged from 16.9 to 26.4 ppt near the surface and from 18.2 to 26.1 ppt near the bottom, averaging 23.1 ppt (surface) and 23.3 ppt (bottom) (NYCDEP 2021). Surface and bottom water temperatures ranged from 0.8°C (January 2018) to 25.3°C (July 2020), with less than 0.1°C average difference between surface and bottom (NYCDEP 2021). The Davidson Laboratory Urban Ocean Observatory modeling indicates that salinity in East River is less variable north of Hell Gate due to the increased influence of highly saline waters from Long Island Sound (Stevens Institute of Technology 2022).

4.8.2.5 Sediment Physical Characteristics

Hudson River

The Hudson River has been extensively surveyed to characterize physical sediment substrates. Investigations conducted by The Benthic Mapping Project supported by the NYSDEC Hudson River Estuary Program between 1998 and 2003 (Bell et al. 2010) indicated that substrates in the lower Hudson Estuary represented five major surficial sediment types:

- mud (clay, silt, fine sands);
- sands which have a smooth to mottled bottom;
- coarse gravel and sand mixtures with irregular bottoms that are composed of compact gravel and cobble deposits intermixed with sand;
- mix of mud, sand, and gravel; and
- bedrock, cobbles, and boulders that are often overlain by variable thickness of unconsolidated sediments.

Along the two stretches of the Hudson corresponding to submarine portions of the proposed transmission line corridor, data from the Benthic Mapping Project indicate the vast majority of surficial riverbed sediments range between mud (i.e., silt and clay) and sand, with small stretches towards the downstream extent of the Project (near confluence with Spuyten Duyvil and the Harlem River) gravel (Bell et al. 2010). See Figure 4-8 (see Attachment 1 to this Exhibit) for a depiction of sediment types identified during the Benthic Mapping Project.

In summer 2022, surface sediment was collected by the Applicant within the proposed Project corridor at 23 benthic sampling stations within the Hudson River. At the majority (17 of 23) of these stations the sediment was mud or sandy mud (i.e., mostly silt and clay) based on the Benthic Mapping Project classification scheme, mainly between Newburgh and Dobbs Ferry. Gravelly sand was documented near West Point (Station BB-07) and muddy sand (i.e., mostly sand with over 10% silt and clay) was the dominant sediment type south of Hastings-on-Hudson. See Table 4-13 for a summary of sediment types identified at the benthic sampling stations. See Figure 4-8 (see Attachment 1 to this Exhibit) for a depiction of the benthic sampling station locations.

Table 4-13. 2022 Benthic Surface Grab Sample Sediment Types

Sampling Station	Waterbody	Sediment Type[1]	Latitude (Degrees Decimal Minutes)	Longitude (Degrees Decimal Minutes)
BB-01	Hudson River	Sandy Mud	41°31.174'	74°0.301'
BB-02	Hudson River	Sandy Mud	41°30.913'	74°0.081'
BB-03	Hudson River	Sandy Mud	41°29.52'	74°0.146'
BB-04	Hudson River	Sandy Mud	41°27.624'	74°0.181'
BB-05	Hudson River	Sandy Mud	41°26.512'	73°58.947'
BB-06	Hudson River	Mud	41°24.986'	73°57.995'
BB-07	Hudson River	Gravelly Sand	41°23.68'	73°56.854'
BB-08	Hudson River	Muddy Sand	41°22.16'	73°57.359'
BB-09	Hudson River	Mud	41°20.578'	73°57.825'
BB-10	Hudson River	Mud	41°19.182'	73°58.931'
BB-11	Hudson River	Sandy Mud	41°17.906'	73°57.609'
BB-12	Hudson River	Sandy Mud	41°16.778'	73°56.921'
BB-13	Hudson River	Mud	41°8.85'	73°53.043'
BB-14	Hudson River	Sandy Mud	41°7.448'	73°52.814'
BB-15	Hudson River	Mud	41°5.783'	73°52.787'
BB-16	Hudson River	Sandy Mud	41°4.204'	73°52.783'
BB-17	Hudson River	Mud	41°2.57'	73°52.744'
BB-18	Hudson River	Mud	41°0.941'	73°53.035'
BB-19	Hudson River	Muddy Sand	40°59.32'	73°53.39'
BB-20	Hudson River	Muddy Sand	40°57.721'	73°53.891'
BB-21	Hudson River	Muddy Sand	40°56.147'	73°54.454'
BB-22	Hudson River	Muddy Sand	40°54.653'	73°55.151'
BB-23	Hudson River	Sandy Mud	40°53.041'	73°55.581'
BB-24	Harlem River	Sandy Mud	40°52.518'	73°55.009'
BB-25	Harlem River	Sand	40°51.557'	73°55.061'

Sampling Station	Waterbody	Sediment Type[1]	Latitude (Degrees Decimal Minutes)	Longitude (Degrees Decimal Minutes)
BB-26	Harlem River	Sand	40°50.402'	73°55.869'
BB-27	Harlem River	Gravelly Sand	40°48.932'	73°55.977'
BB-28	Harlem River	Muddy Sand	40°47.145'	73°55.698'
BB-29[2]	East River	Sand	40°47.64'	73°54.279'

Notes:
[1] Sediment type based on grain size classification system applied by the Hudson River Estuary Program Benthic Mapping Project (https://gis.ny.gov/gisdata/metadata/nysdec.hudson.sed.type.html)
[2] BB-29 is positioned slightly north of the proposed Project corridor. Attempts to collect sediment from a sampling station within the proposed Project corridor within East River (BB-30) were unsuccessful after multiple attempts due to hard substrate.

Harlem River

There is limited reporting on the physical characteristics of Harlem River sediments (Fisher 2016). The USGS Continental Margin Mapping (CONMAP) dataset broadly categorizes surface sediments in the Harlem River as "gravel-sand" (USGS 2005). Results from the CHPE project marine survey within the Harlem River indicated the sediment type varied between coarse grains to silts and clays (HDR-DTA 2010a). Additionally, large amounts of debris (e.g., ranging from tires, riprap, and timbers to sunken vehicles) and rock outcrops were observed during sediment surveying (HDR-DTA 2010a). In summer 2022, surface sediment was collected by the Applicant within the proposed Project corridor at five benthic sampling stations in the Harlem River. The sediment collected at these stations was mostly sand with some gravel, silt, and clay (see Table 4-13). However, most sampling stations in the Harlem River had to be repositioned due to hard substrate at the originally planned station locations.

East River

Historic sediment data from previous studies are also limited within the East River in the vicinity of the proposed Project corridor, partly due to exposed bedrock and large amounts of debris. The USGS CONMAP dataset broadly categorizes surface sediments within the proposed transmission line corridor as "gravel-sand," although the substrate is categorized as "sand-clay/silt" within East River immediately north of the Project corridor (USGS 2005). Results from the CHPE project marine survey indicate that sediments within the East River tend to be coarser, and, in some cases, reach bedrock (HDR-DTA 2010a). The 2010 CHPE Marine Survey Report states that the riverbed bathymetry is highly irregular, described as jagged, with a significant amount of exposed bedrock. Coarse materials and debris are scattered throughout the area. Overall, the results from the CHPE project marine survey indicate that sediments within the East River tend to be a mixture of sand, gravel, and cobble (HDR-DTA 2010a). Sediment surveys show that surface sediment type varied from brown sand to silts and gray silty clays (HDR-DTA 2010a). Due to significant modifications of the East River (channelization, bulkheading, upland filling, and urbanization along its shorelines), sediment characteristics are highly variable (HDR-DTA 2010a). In summer 2022, surface sediment was collected by the Applicant at a benthic sampling station within the East River slightly north of the proposed Project corridor. The sediment collected at this station was predominantly sand (less than 10% gravel, silt or clay) (see Table 4-13). Attempts to collect sediment from another sampling station within the proposed Project corridor in East River (BB-30) were unsuccessful after multiple attempts due to hard substrate.

4.8.2.6 Sediment Suspension and Deposition

Ambient TSS concentrations and rates of natural sedimentation vary along the proposed submarine transmission line corridor. TSS data recorded in the upper Hudson River at Poughkeepsie, New York, showed a range of ambient concentrations between 10 and 50 mg/L (USGS 2022; Vinhateiro et al. 2013) over the course of a year. Between January 2017 and August 2022, TSS measurements by NYCDEP ranged between 5 and 98 mg/L at St. Vincent in the Hudson River (south of Yonkers), between 4 and 91 mg/L at Macombs Dam Bridge in the Harlem River, and between 5 and 46 mg/L at Hell Gate in East River (NYCDEP 2022). Klingbeil and Sommerfield (2005) reported annual deposition rates for the entire lower Hudson River Estuary of 4 in/yr (10 cm/yr). Suspended sediment concentrations in the Hudson tend to increase with depth during medium- and low-flow conditions, suggesting that riverbed sediment resuspension may be as important to TSS concentrations during these conditions as the sediment inputs from tributaries (Findlay et al. 1990). Annual sediment loading into the Hudson River is approximately 0.2 to 1.0 megatons, with 20% to 40% of the contribution from lateral tributaries (Ralston et al. 2013). However, extreme events like tropical storms Irene and Lee can result in sediment loading over a few days that is several times larger than the annual average (Ralston et al. 2013).

4.8.3 Existing Marine Chemical Characteristics

4.8.3.1 Sediment Quality

General sediment chemistry characteristics for each major tidally influenced waterway followed or crossed by the proposed submarine transmission line corridor are summarized below based on a review of literature for previous studies within the Project area, with a focus on anthropogenic contaminants. As noted above, the Applicant will conduct a marine field survey to evaluate sediment chemistry conditions within the proposed submarine transmission line survey corridor in fall 2022. The results will be submitted to the Commission as soon as they become available.

Hudson River

The Hudson River has been extensively surveyed to characterize sediment chemistry, particularly contaminants, given the historical anthropogenic influences on the river.

One the major sources of contamination in the Hudson River is from the discharge of an estimated 1.3 million pounds of polychlorinated biphenyls (PCBs) into the Hudson River from General Electric (GE) capacitor manufacturing plants at Hudson Falls and Fort Edward between approximately 1947 to 1977. The sites are near the former Fort Edward Dam (RM 194.8), over 120 miles north of the northern end of the Project's proposed transmission line corridor at Newburgh. However, PCBs have been transported from the Upper Hudson River to the Lower Hudson River (i.e., south of the Federal Dam at Troy), such that PCBs concentrations in the Lower Hudson River in the vicinity of the Project corridor also pose ecological risks (EPA 2002). As such, EPA declared the entire Hudson River a Superfund Site in 2002, and a two-stage dredging project began to remove contaminated sediment in the Upper Hudson River in 2009 (EPA 2019). EPA's (2019) second five-year review report found that PCB concentrations have been decreasing with time in surface sediments. Although the exact rate of decline was difficult to determine because sediment data were not collected consistently, the results indicate a decay rate similar to that predicted in the 2002 Record of Decision. General Electric has recently agreed to fund a PCB study in the lower Hudson River from Troy Dam to the mouth of the New York Harbor, which will begin in early 2023 (EPA 2022e).

The southern end of the submarine corridor within the Hudson River is part of the New York/New Jersey Harbor Estuary. Elevated levels of contaminants are present in the Harbor Estuary due, in part, to years of unregulated industrial pollution. In addition to the PCB discharge noted above, chemicals originated coal

gasification (dioxins and volatile hydrocarbon compounds), coal-powered energy production (mercury), battery manufacturing (cadmium), herbicides and pesticide production and application (dioxins released from Agent Orange, dichlorodiphenyltrichloroethane or DDT, chlordane, and dieldrin), and many other industrial sources (NY/NJ HEP 2021). The passage of several laws, beginning with the CWA in 1972, greatly reduced the discharge of these chemicals into the estuary. But these and other contaminants are still present at high concentrations in the sediments within and near the proposed transmission line corridor.

The Harbor at Hastings State Superfund Site is an area known to have high levels of contaminants in the sediment adjacent to the submarine corridor. It is listed as a Class 2 site in the State Registry of Inactive Hazardous Waste Sites. The contaminants of concern identified by NYSDEC consist of copper, lead, zinc, and PCBs (Aroclors 1260 and 1262) associated with wire manufacturing operations that ceased in 1974 (NYSDEC 2012). In-water remedial investigations have been performed since 2003 to characterize the extent of contamination. The proposed remedy includes nearshore dredging to a depth of 6 ft (1.8 m) below the riverbed surface, installing sheet pile to create a containment area, and backfilling with clean material as appropriate (NYSDEC 2012). The Applicant's proposed transmission line corridor avoids the area identified as having high levels of contamination. The Applicant's ongoing marine field survey will help identify potential contaminant concentrations in the corridor adjacent to the Harbor at Hastings site.

The Applicant is also aware of the elevated potential for encountering unexploded ordnance (UXO) in the vicinity of West Point, associated with historical training activities, and the U.S. Army's efforts to identify and remediate the UXO through its Military Munitions Response Program. The Applicant is reviewing Project-specific geophysical data to assess the potential presence of UXO in this area.

In 2010, sediment chemistry was analyzed within the Hudson River for the CHPE project, including PCBs; trace metals; polycyclic aromatic hydrocarbons (PAHs); pesticides, and, in limited locations, dioxins/furans (HDR-DTA 2010a). The 2010 CHPE Marine Survey Report provided a characterization of sediment chemistry in the Hudson River based on these data. These data were compared to Effects Range–Low (ER-L) and Effects Range-Medium (ER-M) screening thresholds. ER-L concentrations have a calculated 10% probability of inducing adverse effects on aquatic organisms. ER-M concentrations have a calculated 50% probability of inducing adverse effects on aquatic organisms. The data were also compared to the NYSDEC sediment quality threshold values for dredging or in-water placement described in the Technical and Operational Guidance Series (TOGS) 5.1.9 (NYSDEC 2004). TOGS 5.1.9 defines Class A as "No appreciable contamination (no toxicity to aquatic life," Class B as "moderate contamination (chronic toxicity to aquatic life)," and Class C as "high concentration (acute toxicity to aquatic life)." Below is a brief summary of the CHPE survey results for sediment chemistry in the lower Hudson River, south of Newburgh (approximate river mile 62, where RM 0 is at The Battery in Manhattan):

- Total PCB concentrations exceeded Class A levels and fell within the Class B range between RM 62 (I-84 at Newburgh) and RM 42 (Peekskill). Between RM 34 (Croton Point) and RM 14 (junction with the Harlem River), most total PCB results were below Class A thresholds except near RM 23 (Dobbs Ferry) where concentrations were in the Class B range.
- Between the shore crossings near RM 62 (I-84 at Newburgh) and RM 14 (junction with the Harlem River), most metals concentrations were below ER-L and Class A thresholds. All metals analyzed in sediments were below ER-M levels.
- Sediment PAH concentrations were not detected between RM 32 (Sparta) and RM 31 (Scarborough). Between RM 62 and RM 14 sediment PAH concentrations were below Class A threshold and ER-L threshold with the exception between RM 29 (Sleepy Hollow) and RM 20 (Hasting-on-Hudson) which exceeded the ER-L for acenapthlene,

- Multiple compounds exceeded the ER-L threshold but were below the ER-M near RM 51 (Glenclyffe) which also exceeded the Class A threshold for total DDD/E/T which is within the Class B range. Near RM 55 (Hudson Highland State Park) and RM 46 (Ring Meadow) exceeded the ER-L and ER-M threshold for multiple compounds. Total DDD/E/T levels in sediment pesticide concentrations exceeded the Class B threshold and fell within Class C range. No pesticides were detected between RM 32 and MM 166 with the exception of a sample at RM 24 which exceeded the ER-L threshold for various pesticides. Near RM 24, pesticide dieldrin exceeded the ER-M threshold, and there was a Class A threshold exceedance of DDD/E/T (i.e., in the Class B range).

Sediment chemistry data were collected during the 1998 to 2001 NYSDEC CARP survey within the New York/New Jersey Harbor Estuary (Harbor) (NYSDEC 2003). Raw data from CARP no longer appear to be publicly accessible online, so the following is a summary of the CARP data for sampling sites in the Hudson River near the proposed transmission line corridor as presented in the CHPE Project Aquatic Sampling and Analysis Plan (HDR-DTA 2010b):

- Samples collected near Croton-On-Hudson, NY indicated no metals or pesticide concentrations above ER-M thresholds, and dioxin/furan compounds were detected at levels less than 1 parts per billion (ppb) in all cases. All PAH concentrations were below ER-L thresholds, and a single Total PCB result was reported at 836 ppb.
- Near Piermont, NY, dioxin/furan compounds were usually less than 1 ppb. Metal concentrations were below ER-M thresholds in all cases, although mercury concentrations were elevated compared to results near Croton-On-Hudson. Pesticide concentrations were also higher near Piermont than results obtained near Croton-On-Hudson, but concentrations did not exceed ER-M thresholds in any of the samples. Fluorine was the only PAH to exceed the ER-L threshold, and Total PCBs were reported at 1,069 ppb.
- Near the George Washington Bridge, south of the confluence of the Hudson and Harlem Rivers, dioxin/furan compounds were greater than 1 ppb. Metal concentrations exceeded ER-L in most samples and both mercury and silver exceeded ERM. Most pesticide concentrations exceeded ERL, but only Total DDT exceeded ER-M. Several PAHs exceeded ER-L, and total PCBs were reported at 4,577 ppb.

Further, sediments collected in the Lower Hudson River during the CARP were evaluated for toxicity using *Ampelisca a*. Survival of this polychaete was an average of 87% for sediments collected near Croton-on-Hudson, an average of 64% near Piermont, and an average of 97% near the confluence with the Harlem River (at Spuyten Duyvil Creek) (NYSDEC 2003).

Harlem River

Although bed sediment-quality data in the Harlem River are limited, sediment data were collected in 2003 from one site in the Harlem River by EPA as part of the Regional Environmental Monitoring and Assessment Program (REMAP) in the waters of the Harbor (Mueller and Estabrooks 2006; Fisher 2016). Bed sediment-quality data were also collected at six sites in 2000 by NYSDEC as part of the CARP in the waters of the Harbor (Litten 2003; Lodge et al. 2009; Fisher 2016). Both surveys showed concentrations of mercury, lead, copper, and nickel in bed sediment to be lower at Harlem River sampling locations than at many of the other sampling locations within the Harbor. USGS recommends further analysis assessing the state of the Harlem River's sediment environment (Fisher 2016).

In 2010, sediment chemistry was analyzed for the CHPE project within the Harlem River, including PCBs, trace metals, PAHs, pesticides, and dioxins/furans (select locations). The 2010 CHPE Marine Survey Report provided a characterization of sediment chemistry in the Harlem River based on these data. Below

is a brief summary of the CHPE project sediment chemistry results within the Harlem River for sampling sites in or near the proposed Project corridor (reference is made to the approximate river mile):

- Total PCB concentrations were all below the NYSDEC Class A threshold with the exception of a sample at the proposed sampling station BB-26 that fell above the Class C threshold.
- Sediment metal concentrations west of Broadway Bridge, north of University Heights Bridge, and south of Madison Ave. Bridge were below Effect Range-Low (ER-L) and Class A thresholds. Sediment metal concentrations north of Washington Bridge and Macombs Dam Bridge were detected above the ER-L but below the Effect Range-Median (ER-M) (NOAA Fisheries 1999) thresholds.
- Sediment PAH concentrations near just west of Broadway Bridge and Macombs Dam Bridge were not detected. Sediment PAH concentrations north of University Heights Bridge, north of Washington Bridge, and south of Madison Ave. Bridge had multiple PAH compounds detected above the ER-L threshold.
- Sediment pesticide concentrations west of Broadway Bridge, Macombs Dam Bridge, and south of Madison Ave. Bridge were not detected. Pesticide Dichlorodiphenyldichloroethane (4-4'-DDD) was detected above the ER-L north of University Heights Bridge and north of Washington Bridge, putting the Total Dichlorodiphenyldichloroethane (DDD/E/T) concentration for these sediments in the NYSDEC Class B range.

Data collected during the 1998-2001 CARP sampling effort within the Harlem River included sediment chemistry data from 14 samples. In this dataset, lead concentrations exceeded the ER-M threshold in two samples, silver levels exceeded the ER-M threshold in five samples, and mercury levels exceeded the ER-M threshold in all samples. Dieldrin concentrations exceeded the ER-M threshold in one sample, and Total DDT levels exceeded the ER-M threshold in 9 samples. Total PCB concentrations ranged from 455 to 5,408 ppb, with the highest concentrations at Spuyten Duyvil (HDR-DTA 2010a). Further, sediments collected in the Harlem River during the CARP were evaluated for toxicity. An average of only 1% of the polychaete *Ampelisca a*. test species survived in sediments collected near the Willis Avenue bridge, while an average of 31% survived in sediment collected near the mid-point of Randall's and Ward's Islands (NYSDEC 2003).

East River

In 2010, sediment chemistry was analyzed within the East River for the CHPE project, including PCBs, trace metals, PAH, pesticides, and dioxins/furans (at select locations) (HDR-DTA 2010a). The 2010 CHPE Marine Survey Report provided a characterization of sediment chemistry in the East River based on these data. Below is a brief summary of the sediment chemistry results within the East River for the CHPE project sampling sites in the vicinity of the proposed transmission line corridor:

- No PCBs were detected within the East River. Dioxins did not exceed the Technical and Operational Guidance Series 5.1.9 Class A threshold (NYSDEC 2004). However, when non-detects were represented by half of the reporting limit for each individual dioxin/furan compound, the CHPE sample taken in the vicinity of the proposed Project corridor between falls into the Class B range.
- With the exception of nickel, metals concentrations were below ER-L and Class A thresholds in the vicinity of the proposed Project corridor.

- Sediment PAH concentrations were measured at Class B levels within the vicinity of proposed Project corridor.
- No pesticides were detected within the East River.

Data collected during the 1998-2001 CARP sampling effort in the Upper East River near Rikers Island and Wards Island included results from 14 sediment chemistry samples. In this dataset, metals typically exceeded ER-L thresholds. Cadmium and copper concentrations exceeding ER-M thresholds were detected in four samples near Rikers Island, and copper levels exceeded the ER-M threshold in one sample near Wards Island. Lead levels exceeded ER-M thresholds in nine samples near Rikers Island and Wards Island and mercury and silver exceeded ER-M in all samples. PAHs and pesticides concentrations exceeded ER-M thresholds in several samples. Total PCB concentrations ranged from 726 ppb near Wards Island to 5,107 ppb near Riker's Island. Dioxin/furan compound detections were below 1 ppb (HDR-DTA 2010).

Further, sediments collected in the East River during the CARP were evaluated for toxicity. An average of 88% of the polychaete *Ampelisca a*. test species survived in sediments collected near the mouth of the Bronx River, while an average of only 1% survived in sediment collected east of Rikers Island near Flushing Bay (NYSDEC 2003). These sampling locations are over 2 miles from the proposed submarine corridor, so the results may not be representative of sediment within the corridor but reflect the range of sediment quality that is present in the vicinity of the corridor.

4.8.3.2 Water Quality

General water chemistry and contaminant characteristics for each of the major tidally influenced "marine" waterbodies crossed by the submarine transmission line corridor are summarized below based on a review of literature for previous studies within the Project area, with a focus on anthropogenic contaminants.

Hudson River

Within the proposed submarine corridor, the Hudson River has been classified under 6 NYCRR Part 701 as Class B (freshwater) between Newburgh and the northern Westchester County line, and Class SB (saline) for the remainder of the submarine corridor south to the confluence with the Harlem River (at Spuyten Duyvil Creek) (see Figure 4-9 in Attachment 1 to this Exhibit). The best usages of both Class B and Class SB waters are primary and secondary contact recreation and fishing. These waters are intended to be suitable for fish, shellfish and wildlife propagation and survival. The Class B (1301-0003) and SB (1301-0005/0094) waters of the Lower Hudson River within the submarine corridor are included on the New York State 303(d) list of impaired waters due to PCBs from contaminated sediment that have led to fish consumption advisories (NYSDEC 2020a). However, these waters are proposed for delisting in 2022 based on flaws in the original analysis (NYSDEC 2022c).

Water samples collected along the Hudson between 2008 and 2017 by Riverkeeper and its partners indicated that concentrations of the fecal indicator bacteria *Enterococci* met the EPA guidelines for safe swimming (i.e., single sample maximum of 60 organisms per 100 mL in fresh water [EPA 2018]) over 80% of the time at most locations near the proposed submarine corridor, but concentrations at certain sites like the Newburgh launch ramp, Tarrytown Marina, and Saw Mill River exceeded the criteria at least 40% of the time (Riverkeeper 2017).

As noted above, the southern end of the submarine corridor within the Hudson River is part of the New York/New Jersey Harbor Estuary, which has a legacy of contamination due to discharges from industrial processes, including PCBs, metals, pesticides, and dioxins (NY/NJ HEP 2021). While there has been a substantial reduction of such discharges since the mid-1970s, contaminant levels in the river sediments continue to degrade water quality. Additionally, water quality is impacted by discharges from combined

sewer overflows (CSOs) and wastewater discharged from publicly owned treatment works (POTWs) (NY/NJ HEP 2021). However, the Class SB waters of the Lower Hudson crossed by the proposed submarine corridor supports multiple uses including primary contact swimming (NY/NJ HEP 2021). Several parameters are measured to assess water quality in the New York/New Jersey Harbor Estuary, providing important information for determining the ecological health of the estuary and when to establish health advisories for activities such as swimming and shellfishing. The NY/NJ HEP develops periodic reports that focus on four primary water quality parameters: pathogenic bacteria (*Enterococcus* and fecal coliform), dissolved oxygen, nitrogen, and chlorophyll-*a* (NY/NJ HEP 2021).

Considering more recent monitoring results from Mt. St. Vincent (just south of Yonkers) between January 2017 and August 2021, dissolved oxygen levels ranged from a low of 2.09 mg/L to a high of 15.34 mg/L. The daily average was approximately 6.0 mg/L (bottom) to 7.7 mg/L (surface) over this period. The values met the New York State water quality standard for dissolved oxygen acute toxicity in Class SB waters (minimum 3.0 mg/L) (6 NYCRR 703.3) approximately 99% of the time. During the same period, daily *Enterococci* concentrations ranged between 1 cfu/100 mL and 210 cfu/100 mL, with an average of 21 cfu/100 mL (NYCDEP 2021). These values met the EPA-recommended single sample maximum for marine water (maximum of 104 cfu/100 mL [EPA 2018]) over 95% of the time. In comparison, the New York State water quality standards require the 30-day mean *Enterococci* concentration to be 35 cfu/100 mL or less in Class SB waters (6 NYCRR 703.4). Total Kjeldahl nitrogen concentrations ranged from 0.20 mg/L to 2.75 mg/L, with an average of 0.60 mg/L (NYCDEP 2021).

Harlem River

The Harlem River has been classified under 6 NYCRR Part 701 as Class I (saline) waters. The best usages of Class I waters are secondary contact recreation and fishing. These waters are intended to be suitable for fish, shellfish, and wildlife propagation and survival. These waters (1702-0004) are included on the New York State 303(d) list of impaired waters due to PCBs from contaminated sediment that have led to fish consumption advisories, as well as impairment due to garbage and refuse from CSO and urban stormwater runoff, which is subject to a 2012 New York City CSO Consent Order (NYSDEC 2020a). With respect to PCBs, the Harlem River is proposed for delisting in 2022 based on flaws in the original analysis (NYSDEC 2022c). However, the river is proposed for additional 303(d) listings in 2022 due to (low) dissolved oxygen, fecal coliforms, and site-specific *Enterococci*, along with the previous listing for garbage and refuse (NYSDEC 2022c).

As reflected in the 303(d) listing discussed above, water quality in the Harlem River is impaired partly due to effluent from several CSOs and POTWs (Fisher 2016; NY/NJ HEP 2021). Water quality monitoring by NYCDEP since 1945 indicated that water quality improved following the passage of the 1972 CWA. These improvements are indicated by the steady increase in median dissolved oxygen concentrations and an overall decrease in fecal indicator bacteria concentrations starting in the late 1970s (Fisher 2016). Further, the highest (90th percentile) fecal indicator bacteria concentrations in samples collected from the Harlem River have decreased significantly since the 1970s (Fisher 2016). Other parameters of water quality used to gauge the health of a water body include TSS and nutrient (inorganic forms of nitrogen and phosphorus) concentrations—mean concentrations for these indicators have also decreased in the past decades.

Water quality monitoring by NYCDEP at stations within the Harlem River and East River indicated that fecal coliform concentrations ranged from 1 to 4,300 cfu/100 mL, with an average of 70.7 cfu/100 mL over a period from 2010 to 2017. In comparison, the New York State water quality standards limit fecal coliform to a monthly mean of 200 cfu/100 mL or less in Class I waters (6 NYCRR 703.4). Average *Enterococci* concentrations during this period ranged from 1.8 to 246 cfu/100 mL, with a mean of 14.3 cfu/100 mL. There is no New York State water quality standard for *Enterococci* in Class I waters. Annual dissolved oxygen levels measured at these stations met the New York State standard for Class I waters (minimum

4.0 mg/L [6 NYCRR § 703.3]) between 72% and 100% of the time over the 8-year period. Mean concentrations of total nitrogen measured during the summer between 2010 and 2017 ranged from 0.39 mg/L to 2.62 mg/L, but generally averaged less than 1.2 mg/L, which is indicative of fair conditions. Further, chlorophyll-*a* measurements at the Harlem and East River stations during this period were generally below a 5 microgram/L concentration, which supports healthier fish habitat (NY/NJ HEP 2021).

Considering more recent monitoring results at Macombs Dam Bridge between January 2017 and August 2021, dissolved oxygen levels ranged from a low of 2.49 mg/L to a high of 13.23 mg/L, where over 95% of the measurements met the New York State water quality standard for Class I waters (minimum 4.0 mg/L) (NYCDEP 2021). The difference between surface and bottom concentrations was on average less than 0.3 mg/L. During the same period, fecal coliform concentrations ranged from 3 to 4,400 cfu/100 mL, with an average of 199 cfu/100 mL (NYCDEP 2021). Over 80% of these concentrations were less than the State water quality standard of 200 cfu/100 mL (monthly average) (6 NYCRR § 703.3). Daily *Enterococci* concentrations ranged between 1 cfu/100 mL and 670 cfu/100 mL, with an average of 49 cfu/100 mL (NYCDEP 2021). Over 90% of the *Enterococci* measurements met the EPA-recommended single sample maximum for marine water (104 cfu/100 mL [EPA 2018]). Total Kjeldahl nitrogen concentrations ranged from 0.29 mg/L to 1.25 mg/L, with an average of 0.63 mg/L (NYCDEP 2021).

East River

In the vicinity of the proposed submarine corridor, the East River has been classified under 6 NYCRR Part 701 as Class I (saline) waters. The best usages of Class I waters are secondary contact recreation and fishing. These waters are intended to be suitable for fish, shellfish, and wildlife propagation and survival. As with the Harlem River, the segment of the East River (1702-0010) crossed by the submarine corridor is included on the New York State 303(d) list of impaired waters due to PCBs from contaminated sediment that have led to fish consumption advisories, as well as impairment due to garbage and refuse from combine sewer overflows and urban stormwater runoff, which is subject to a 2012 New York City CSO Consent Order (NYSDEC 2020a). With respect to PCBs, this segment of East River is proposed for delisting in 2022 based on flaws in the original analysis (NYSDEC 2022c). However, this segment of the river is proposed for additional 303(d) listings in 2022 due to (low) dissolved oxygen, fecal coliforms, and site-specific *Enterococci*, along with the previous listing for garbage and refuse (NYSDEC 2022c).

In addition to CSOs, water quality in the East River is affected by discharge from POTWs, three of which are in the vicinity of the proposed marine corridor near Randall's Island along the East River (NY/NJ HEP 2021). As noted above, the NY/NJ HEP annual reports that focus on four primary water quality parameters: pathogenic bacteria (*Enterococci* and fecal coliform), dissolved oxygen, nitrogen, and chlorophyll-*a* (NY/NJ HEP 2021). A summary of the monitoring results for these parameters within the East River between 2010 and 2017 is presented above under the Harlem River discussion. Chlorophyll levels are relatively low given the concentrations of inorganic nutrients, possibly due to suspended silt inhibiting light penetration into the surface water (Li et al. 2018).

Considering more recent monitoring results near Hell Gate between January 2017 and August 2021, dissolved oxygen levels ranged from a low of 0.70 mg/L to a high of 13.12 mg/L, where over 80% of the measurements exceeded 4.0 mg/L, which is New York's minimum standard for Class I waters (NYCDEP 2021). The difference between surface and bottom concentrations averaged up to 0.5 mg/L. During the same period, daily *Enterococci* concentrations ranged between 1 cfu/100 mL and 350 cfu/100 mL, with an average of 26 cfu/100 mL. Over 90% of the *Enterococci* measurements met the EPA-recommended single sample maximum for marine water (104 cfu/100 mL [EPA 2018]). Total Kjeldahl nitrogen concentrations ranged from 0.28 mg/L to 1.14 mg/L, with an average of 0.60 mg/L (NYCDEP 2021).

4.8.4 Marine Physical and Chemical Potential Impacts and Mitigation

The submarine transmission line will be buried using a trenching technology that is still to be determined at this time; however, trenching may be performed using a water jet plow, mechanical plow, or similar method. Sediment would be directly disturbed by the trenching equipment, and the majority would immediately re-settle into the trench over the cable. The trench may be naturally or mechanically backfilled. Mechanical backfill would likely involve a pass by a specially designed backfill plow. This sediment disturbance will cause a temporary elevation in TSS and potentially associated contaminants. The Applicant conducted a preliminary sediment transport modeling assessment to estimate potential Project-related TSS concentrations down-current of the Project's in-water construction activities. The complete modeling report is provided as Appendix I: Sediment Turbidity Modeling Report to this Exhibit. The analysis conservatively assumed water jetting as the cable burial methodology for the purposes of assessing potential impacts. Two burial depths were simulated: an assumed maximum burial depth of 15 ft (4.6 m) and assumed minimum burial depth of 7 ft (2.1 m). As the transmission line is buried by the plow, sediments will be temporarily resuspended in the water column. A sediment transport model was used to simulate the release of sediments into the water column along the proposed cable route, and to evaluate the resuspension, transport, and deposition of sediments released during the trenching process.

A large-scale hydrodynamic model was constructed to simulate flows along the proposed submarine transmission route corridor. The modeling domain encompassed the Hudson River, Harlem River, East River, Long Island Sound, and other connected waterbodies. Modeling was performed using the three-dimensional unstructured MIKE3 hydrodynamic flow model (DHI 2022a), which was calibrated using predicted water levels at multiple locations in the domain. Hydrodynamic modeling results show that the current speeds in the upper and lower Hudson River segments reach approximately 1.0 m/s. In the center of the Harlem River, current speeds are similar and reach up to 0.9 m/s, with higher velocities occurring mid-way between the confluences with the Hudson and East Rivers.

Sediment transport simulations were performed using the MIKE3 unstructured Mud Transport (MT) module (DHI 2022b). The MT module used hydrodynamic inputs from the MIKE3 nested 3D hydrodynamic model, in de-coupled mode. The transmission line burial operation was simulated as a moving sediment mass source that releases sediment into the bottom grid cell within the water column. The rate of sediment input to the water column was determined based on the assumed burial depth, trench shape, release fraction (portion of trenched material entering the water column), and trencher advance rate. Details regarding the sediment transport analysis are provided in Appendix I: Sediment Turbidity Modeling Report to this Exhibit.

No Project-specific sediment sampling had been conducted at the time of this analysis. Therefore, sediment information from publicly available data sources was used to input a representative mix of sand, silt, and clay which varied along the corridor. Sediment types along the route, which were taken from multiple publicly available data sources, consisted of gravel, sand, silt, and clay. Data from the NYC GIS Database (New York State 2022) were interpolated onto the route in the Hudson River. Sediment grain size data in the Harlem River were taken from CHPE (2010).

Based on the results of the sediment transport modeling, described above, the Applicant estimates that depth-averaged TSS concentrations may exceed 50 mg/L[2] at a distance of 500 ft (152 m) from the route in a few locations, but such exceedances are not expected to occur more than 500 ft (152 m) from the majority of the route. For the 15-ft (4.6-m) burial scenario, modeled TSS remained above 50 mg/L for 1-2 hours in

[2] Modeled TSS concentrations are in addition to ambient conditions.

most areas of the Hudson River, but remained above 50 mg/L for 10-12 hours in a few small areas. Modeled TSS concentrations remained above 50 mg/L for less than a few hours along the west bank of the Harlem River and less than 24 hours along the east bank. In the 7-ft (2.1-m) burial scenario, TSS did not exceed 50 mg/L more than 500 ft (152 m) from the modeled route in the Hudson River and concentrations greater than 50 mg/L did not persist for more than a few hours at any location in the Hudson River. Depth-averaged TSS concentrations only exceeded 50 mg/L along the east bank in the Harlem River. Concentrations above 50 mg/L typically persisted for less than a few hours for most areas of the Harlem River, and did not last longer than 12 hours in any area in the Harlem River. The modeled TSS concentrations were generally higher in locations with higher fractions of silt/clay and were also greatly influenced by the anticipated depth of burial due to the difference in volume of sediment disturbed. Compared to a 15-ft (4.6-m) burial scenario, a 7-ft (2.1-m) burial scenario resulted in significantly lower TSS concentrations in all locations, and significantly lower durations during which concentrations exceeded 50 mg/L. Project-related TSS concentrations did not exceed 50 mg/L in the East River.

Deposition thickness from the trenching activity is not predicted to be measurable at distances greater than 100 ft (30 m) from the route in the Hudson River. In the Harlem River, deposition thickness may reach approximately 0.3 inches (0.8 cm) along the riverbank in a few locations, but is predicted to be less than 0.03 inches (0.08 cm) in many other locations. The modeling results will be revised following completion of the Applicant's Project-specific sediment survey in fall 2022.

In areas where the Project-specific sediment survey indicate high levels of contaminants (i.e., those exceeding NYSDEC Class C thresholds), modeling will also be performed to determine the potential Project-related contaminant concentrations in the water column down-current of the construction activities. If modeling indicates that New York water quality standards may be exceeded, the Applicant will evaluate measures to reduce concentrations to the extent practicable and, if necessary, request a regulatory mixing zone to comply with New York water quality standards. If dredging is necessary in areas with elevated (Class C) sediments, it would be performed using an environmental bucket to minimize resuspension of contaminants.

The in-water construction may temporarily increase vertical mixing within the water column, but the effect would be temporary and very localized, such that it is not expected to significantly affect temperature or salinity stratification in the Hudson River. In the Harlem River, the water column is naturally well-mixed and the Applicant would cross the East River using HDD so the water column should not be disturbed. During operation, there is a potential for increases in temperature of the sediment overlying the cable (Emeana et al. 2016; Taormina et al. 2018). This effect is expected to be negligible given the anticipated minimum burial depth of 7 ft and dissipation of heat well below the biologically active zone in the upper layer of the riverbed.

HDD will be used at several landfalls to minimize impacts on coastal resources. Drilling fluid will be necessary to facilitate the HDD. The in-water exit location will likely include excavation of a pit or installation of a cofferdam to collect any drilling fluids that may accumulate at the exit point during the HDD process. The drilling fluid is expected to be a water-based formulation that would include a natural clay product (e.g., bentonite or attapulgite) as the primary additive and other non-petroleum-based additives that control the characteristics of the fluid (e.g., thickness and viscosity) to maintain the borehole and facilitate the progression of the drill. There is a chance that some of the drilling fluid will be released into the water column. However, measures will be taken to minimize the amount of fluid released into the water column. For example, a small pit will be excavated at the entry and exit points to help retain excess drilling fluid. The drilling fluid is expected to remain primarily within the pits because it would be significantly denser than water. Immediately following installation of the cable through the borehole, drilling fluid would be collected from the drilling pit to the extent practicable and disposed at an appropriate upland facility. Depending on substrate properties at a given landfall, a steel casing may be installed through the upper

layers of the soil/sediment to guide the drill string and reduce the risk of inadvertent release of drilling fluid. Therefore, the Applicant expects the Project's HDD activities will conform to state and national water quality standards.

In the event of a potential inadvertent release of drilling fluid, increased turbidity and sedimentation would likely occur in the lower portion of the water column. Localized increases of pH may occur due to the higher pH of the typical clay-based drilling fluid additives. The Applicant will implement an HDD Inadvertent Release Response Plan (or equivalent) to monitor and control the release, potentially including the use of loss circulation material additives to plug the release pathway(s) to the surface. If an inadvertent release cannot be adequately controlled, the Applicant will suspend drilling and consider an adjusted drilling location. The HDD Inadvertent Release Response Plan will be developed in coordination with NYSDPS and NYSDEC and included in the EM&CP.

4.9 Fisheries and Benthic Resources

This section describes the existing benthic and pelagic habitats, finfish and invertebrate communities (including shellfish), and commercial and recreational fishing activity known or expected to occur within the proposed submarine and terrestrial transmission line corridors. This section also discusses the potential impacts on these resources and measures the Applicant will take to avoid, minimize, or mitigate these impacts. As noted in Section 4.8, the affected environment includes approximately 47 miles of tidally influenced fresh and saline waters along the submarine corridor. As noted in Section 4.7, the terrestrial corridor will cross 221 freshwater streams. This section addresses requirements of 16 NYCRR § 86.5 relative to fish and other aquatic life in the tidally influenced waterbodies crossed by the proposed submarine transmission line corridor and freshwater streams and rivers crossed by the terrestrial corridor along with provisions to protect these biological resources from Project activities.

4.9.1 Fisheries and Benthic Resources Studies and Analysis

4.9.1.1 Marine Corridor

The Applicant conducted a benthic survey in 2022 to assess current environmental conditions along the submarine transmission line corridor. Benthic grab samples were collected and analyzed to characterize the macrobenthic invertebrate communities that may be affected by Project activities. Grab sampling was conducted to supplement and verify information on the benthic habitats within the submarine corridor that was obtained during previous studies, particularly the Hudson River Benthic Mapping Project (Bell et al. 2010). A total of 29 sampling stations were sampled within the proposed submarine corridor, approximately 2 miles apart along the route (Figure 4-8 in Attachment 1 to this Exhibit). The complete results of the Project-specific benthic survey will be provided to the Commission as soon as they become available.

A literature search was performed to identify benthic surveys reported within the past 30 years (see Table 4-14) to help characterize the current benthic communities along the Project route, and the results are summarized below. Surveys conducted prior to 2010 were included for historical context and provide a relatively broad distribution of benthic sampling stations along the proposed route. Survey data collected since 2010 better represent the current site conditions of the various waterbodies, but the extent of survey areas recently analyzed for benthic community composition is relatively limited.

Table 4-14. Summary of Benthic Surveys reported since 1997 in the Vicinity of the Project Area.

Region	Study	Author	Year	Locations (s)	Substrate	Key Species	Comments
Harlem River	Species Richness and Interaction of Benthic Marine Macroinvertebrates within the Lower Hudson River Estuary	Carter and Rosin	2017	Several sampling locations on the Harlem River	n/a	Ragworm and Eastern Mudsnail	Samples were taken from bulkhead structures in September 2016.
Harlem River	A Benthic Macroinvertebrate Survey of Little Hell Gate Salt Marsh	Swetz	2016	Randall's Island	n/a	Polychaetes, Eastern Mudsnail	Samples were collected using a drop net in July 2016.
Harlem River/ East River	Champlain Hudson Power Express Project, Attachment E 2020 Marine Survey Report	HDR-DTA	2010	Several sampling locations on the Harlem River	Grey to black sands, grey clayey silts and silts	Polychaetes	Both rivers were sampled in the spring of 2010.
Hudson River	2020 Post-Construction Oyster Monitoring Final Report - The Governor Mario M. Cuomo/New NY Bridge Project at Tappan Zee Oyster Substrate and Water Quality Monitoring	AKRF Inc, Hudson River Foundation, Billion Oyster Project, and University of New Hampshire	2021	Three sites near the Mario Cuomo Bridge (former Tappan Zee Bridge)	Artificial reef	Eastern oyster (*C. virginica*), bay barnacle (*B. improvises*), hooked mussel (*I. recurvum*), Bryozoan (*Membranipora* sp.)	Extensive colonization of artificial reef structures over a 3-year period
Hudson River	Tappan Zee Hudson River Crossing Project Environmental Impact Statement, Appendix F: Ecology F-9 Essential Fish Habitat Assessment	New York State Department of Transportation	2012	Mario Cuomo Bridge	varied	Polychaetes	Sampling occurred pre- and post-construction of the bridge in 2012.
Hudson River	Invertebrate Communities of Low-Salinity Wetlands: Overview and Comparison between Phragmites and	Yozzo and Osgood	2012	Iona Island and Piermont Marsh	Marshes, varied substrate	Ceratopogonidae and Chironomidae,	Detailed description of benthic communities at both sampling locations. Sampling took place in June, August, and October.

Region	Study	Author	Year	Locations (s)	Substrate	Key Species	Comments
	Typha Marshes Within the Hudson River Estuary					naidid oligochaetes	
Hudson River	The Hudson River Estuary	Levinton and Waldman	2010	Lower Hudson River Estuary	Mud (clay, silt, fine sands), sands, coarse gravel, mix of mud, sand, gravel, and bedrock, cobbles, and boulders	n/a	References Bell et al. (2010) study of Benthic Habitat Mapping Program which included Sediment Profile Imagery (SPI) and Sediment Grabs.
Hudson River	Contamination Assessment and Reduction Project Summary Report	Lodge et al.	2009	Haverstraw Bay	n/a	Amphipods (Gammarus spp.), opossum shrimp (*Neomysis americana*) and rangia (*Rangia cuneata*).	Minimal - general summary of locations sampled in a measure of biotic integrity
Hudson River	Ecology of Hudson River SAV	Findlay et al.	2006	Iona, Peekskill, Indian Point, and Haverstraw	Sand and silt	*Vallisneria americana* and *Trapa natans*; Chironmidae, oligochaetes, hydroids, gastropods, amphipods	PONAR grabs, cores, and Downing box samplers were used.

Region	Study	Author	Year	Locations (s)	Substrate	Key Species	Comments
Hudson River	Hudson River Estuary Data and Maps	New York State Office of Information Technology Services	2004	Tappan Zee Region and the Newburgh Bay Region	Varied, sand, gravel, and mud	n/a	Most literature references this program for benthic data.
Hudson River	Hudson River Estuary Biocriteria Final Report	Lanso et al.	2003	Lower Hudson River Estuary (RM11 to 40)	n/a	Polychaetes, Tubificoides spp., the clam (*Rangia cuneata)*, and the amphipod (*Leptocheirus plumulosus*)	Detailed report on benthic community of lower Hudson River Estuary.
Hudson River	The Pearly Mussels of New York State	Strayer and Jirka	1997	Hudson River	Gravel	Freshwater pearly mussels	Successfully identified approximately 22 different species of native pearly mussels

The Applicant completed a literature search to identify fisheries surveys reported within the past 30 years (see Table 4-15) to help characterize the current fisheries communities along the submarine corridor. The review assessed current environmental conditions along the submarine corridor in the Hudson, Harlem, and East Rivers, and the results are summarized below. Surveys conducted prior to 2010 were included for historical context and provide a relatively broad distribution of benthic sampling stations along the proposed route. Survey data collected since 2010 better represent the current site conditions of the various waterbodies, but the extent of survey areas recently analyzed for fisheries community composition is relatively limited. The Applicant also reviewed the NOAA Fisheries Essential Fish Habitat Mapper (NOAA Fisheries 2021).

Table 4-15. Summary of Fishery Surveys reported since 1994 in the Vicinity of the Project

Region	Study	Author	Year	Location(s)	Key Species	Comments
East River	New York City East River Fish Species Inventory and Emergence of a Unique Community Science Network	Park et al.	2020	Several sampling locations on the Harlem River	Atlantic Silverside, *Fundulus* spp., Atlantic Menhaden	Between April and December 2019, in Zone 4a and 4b (Randall's and Wards Island) total of 22 fish species comprising 2,464 individual fish were recorded by field clinics by Battery Park City Authority.
East River	Effects of Tide Gates on the Fish Community of the East River	Woodhead	1994	East River	Shad, sturgeon, river herring, blue crab, menhaden and striped bass	Composition and structure of the finfish community and fish movements between East River and lower Hudson River
Hudson River	Hudson River Park Fish Survey Report	Hudson River Park	2021	Hudson River Park	Black sea bass, blackfish, oyster toadfish	Results obtained using minnow traps and crab pots.
Hudson River	Evaluation and optimization of a long-term fish monitoring program in the Hudson River	Nieman et al.	2021	Lower Hudson River Estuary	Striped Bass American Shad Alewife (*Alosa pseudoharengus)*, and Blueback Herring (*Alosa aestivalis*)	Assessment of long-term monitor data collect from Hudson River Biological Monitoring Program (HRBMP) monitor from 1960 until 2017–2020.
Hudson River	Ecology of Hudson River SAV	Findlay et al.	2006	Iona, Peekskill, Indian Point, and Haverstraw	White perch, white catfish, spottail shiner, Atlantic menhaden, bluefish, gizzard shad	Results obtained through gillnet
Hudson River	Hudson River Fisheries and their Environment	Waldman et al.	2006	Lower Hudson River Estuary	Annelids, mollusks, crustaceans and insects. Shad, sturgeon, river herring, blue crab, menhaden and striped bass	Ecological and environmental workings of the Lower Hudson River estuary and the effects on fishes.

4.9.1.2 Terrestrial Corridor

A review of publicly available data was conducted to help characterize the current benthic resources along the proposed terrestrial transmission line corridor. The New York State Wildlife Action Plan (SWAP) guides all partners' efforts to protect Species of Greatest Conservation Need (SGCN) in the State. The SWAP assessed 597 species, identifying important habitats, population trends, and the scope and severity of threats for each. The SWAP also identified a number of freshwater mussel species and likely potential presence on a watershed basis (NYSDEC 2015). The NYSDEC ERM (NYSDEC 2022g) was also used to identify freshwater mussel screening streams.

A review of publicly available data was conducted to help identify freshwater fisheries resources along the corridor. The following data sources were identified and reviewed:

- Atlas of Inland Fishes of New York (Carlson et al. 2016)
- NYSDEC ERM (NYSDEC 2022g)
- NYSDEC DEC info Locator (NYSDEC 2022h)
- Categorization of New York State Trout Stream Reaches (NYSDEC 2022i)

4.9.2 Existing Marine Benthic Resources

The term "marine benthic resources" refers to the organic and inorganic substrate of the riverbeds in and near the proposed submarine transmission line corridor and the plants and animals (i.e., benthos) that inhabit the substrate, particularly invertebrate species and submerged aquatic vegetation (SAV). For the purposes of this Exhibit, the term also refers to "demersal" species that typically inhabit the area on or just above the surface of the riverbed. The marine invertebrates of the Hudson, Harlem, and East Rivers are highly abundant and diverse with over 300 species of macroinvertebrates. The tidally influenced estuarine conditions in the vicinity of the proposed submarine corridor are inherently dynamic and subject to regular disturbance, both natural and anthropogenic. Therefore, much of the benthic environment is inhabited by more adaptable fauna capable of rapid and prolific reproduction within a range of environments. Abundances and community structure of benthic fauna are directly related to water quality within these waterbodies (Levinton and Waldman 2006). The following section describes benthic invertebrate communities and associated habitats documented in the Hudson, Harlem, and East Rivers in recent decades.

Hudson River

Based on the literature review, benthic community structure and population density in the Hudson River is highly variable depending on environmental factors such as water depth, water quality, sediment substrate, SAV presence, and anthropogenic factors. Benthic data between 1998 and 2003 show that the Hudson River has a diverse community of benthic macroinvertebrates including approximately 300 species of annelids, mollusks, crustaceans, and insects (Levinton and Waldman 2006). The survey area in Bell et al. (2010) includes the proposed Project corridor from Newburgh to Manhattan. Benthic community distribution within that range varied according to bottom water salinity and substrate composition. The benthic community south of Newburgh is dominated by estuarine worms and crustaceans. The primary crustaceans observed in historic benthic data in the lower Hudson River Estuary include grass shrimp, sand shrimp, and blue crab. The introduction of non-native zebra mussels dramatically influenced the structure and functionality of the benthic community. In 1997, Strayer and Jirka (1997) identified about 22 different species of native pearly mussels known to be present in the lower Hudson River Estuary including alewife floater (*Anodonta implicate*), eastern elliptio (*Elliptio complanata*), and eastern lampmussel (*Lampsilis radiate*).

Baseline benthic data for the lower Hudson River Estuary were collected as part of the CARP (Lodge et al. 2009). Samples collected in the Hudson River at Poughkeepsie, Haverstraw Bay, Iona Island, and Piermont Marsh Bay (Yozzo and Osgood 2012) included amphipods (*Gammarus* spp.), opossum shrimp, and rangia (*Rangia cuneata*) (Lodge et al. 2009).

An oyster habitat restoration demonstration project associated with mitigation for the construction of the Gov. Mario M. Cuomo Bridge indicated varying levels of colonization on artificial reef structures by oysters and other epibenthic species from 2015 to 2017, even at a site where salinity and dissolved oxygen were well below levels considered optimal for eastern oyster growth and survival for much of the monitoring period (AKRF Inc. et al. 2021). This suggests that oysters in this portion of the river may be adapted to the less-than-optimal conditions. However, early stages of the restoration effort indicated little to no oyster colonization at certain sites where environmental conditions appeared to be favorable (AKRF Inc. 2021). This suggests the presence of other stresses on oyster/bivalve recruitment and growth that are not yet clearly understood.

The 2022 benthic invertebrate survey for the Project examined benthic community composition within the proposed transmission line corridor in the Hudson River. Based on preliminary survey results,[3] 60 unique taxa were observed from stations in the Hudson River. The 20 most abundant benthic invertebrate taxa by relative abundance are presented in Table 4-16. Total abundance per station was generally low, with the exception of station BB12 where total abundance was at least double that of the other stations (Figure 4-10 in Attachment 1 to this Exhibit).

Table 4-16. 20 Most Abundant Taxa Identified for All Stations in the Hudson River by Relative Abundance

Phylum/Class	Order	Family	Taxon	Relative Abundance (%)
Clitellata	Tubificida	Naididae	*Tubificoides swirencowi*	16.48
Clitellata	Tubificida	Naididae	*Limnodrilus hoffmeisteri*	14.97
Gastropoda	Littorinimorpha	Hydrobiidae	-	13.59
Clitellata	Tubificida	Naididae	*Limnodrilus* spp.	12.39
Malacostraca	Cumacea	Leuconidae	*Leucon americanus*	6.04
Thecostraca	Balanomorpha	Balanidae	*Amphibalanus improvisus*	4.44
Malacostraca	Amphipoda	Gammaridae	*Gammarus daiberi*	3.31
Polychaeta	Spionida	Spionidae	*Streblospio benedicti*	3.20
Polychaeta	Spionida	Spionidae	*Boccardiella ligerica*	3.11
Polychaeta	Spionida	Spionidae	*Marenzelleria neglecta*	2.87
Polychaeta	-	Capitellidae	*Mediomastus ambiseta*	2.09
Polychaeta	-	Capitellidae	*Heteromastus filiformis*	1.95
Clitellata (subclass Oligochaeta)	-	-	-	1.75
Polychaeta	Spionida	Spionidae	*Marenzelleria spp.*	1.64

[3] Preliminary data received from the taxonomy laboratory has undergone laboratory quality assurance and quality control, but the draft report is in development.

Phylum/Class	Order	Family	Taxon	Relative Abundance (%)
Malacostraca	Amphipoda	Corophiidae	*Apocorophium lacustre*	1.29
Bivalvia	Myida	Myidae	*Mya arenaria*	1.27
Malacostraca	Isopoda	Anthuridae	*Cyathura polita*	1.07
Polychaeta	Terebellida	Ampharetidae	*Hobsonia florida*	0.98
Nemertea	-	-	-	0.84
Polychaeta	Terebellida	Ampharetidae	*Ampharete oculata*	0.84

SAV is mapped in shallow portions of the Hudson River by the NYSDEC Hudson River Estuary Program (Hudson River National Estuarine Research Reserve and NYSDEC 2000) and NYSDEC Statewide Seagrass Map (NYSDEC 2021a) (Figure 4-8 in Attachment 1 to this Exhibit). The most common native species of SAV in the Hudson River is water celery (*Vallisneria americana*). SAV is generally found in shallow water depths, although beds can occur at greater depths if light penetration allows. The highest abundances of SAV in the Hudson River are found in waters less than 3 ft (0.9 m) deep at low tide (New York Sea Grant 2001). SAV provides important nursery habitat for juvenile fish and foraging habitat for fish, invertebrates, and waterfowl; it is also an important contributor of oxygen to the water. The extent of SAV beds in the Hudson River vary seasonally and annually. The importance of SAV as a Habitat Area of Particular Concern (HAPC) for summer flounder is discussed further in Section 4.9.6.8.

Harlem River

There have been a limited number of benthic surveys in the Harlem River over the last decade; however, Transmission Developers Inc. (TDI) surveyed the length of the Harlem River for the CHPE project (HDR-DTA 2010a). Benthic resources appear generally consistent among sampling efforts from 2010 to 2017. Similar benthic communities were observed from previous sampling efforts. Many sampled taxa within the Harlem River are pollutant-tolerant species including arthropod, ragworm, eastern mudsnail, and polychaetes (Mearns et al. 2015), and benthic communities were dominated by the polychaetes, *Scolecolepides viridis*, Capitelledae, and *Streblospio benedictii*. Overall historic benthic data show relatively low diversity and evenness for the Harlem River. Furthermore, commonly observed benthic organisms associated with highly disturbed and polluted environments such as the Harlem River are typically opportunistic species that can quickly repopulate a habitat (Mearns et al. 2015; HDR-DTA 2010b).

The 2022 benthic invertebrate survey for the Project examined benthic community composition within the proposed transmission line corridor in the Harlem River. Based on preliminary survey results,[4] 49 unique taxa were observed from stations within the Harlem River. The 20 most abundant benthic invertebrate taxa by relative abundance are presented in Table 4-17. Total abundance per station was generally low; however, abundance was at least four-fold higher at station BB28 (Figure 4-11 in Attachment 1 to this Exhibit).

[4] Preliminary data received from the taxonomy laboratory has undergone laboratory quality assurance and quality control, but the draft report is in development.

Table 4-17. 20 Most Abundant Taxa Identified for All Stations in the Harlem River by Relative Abundance

Phylum/Class	Order	Family	Taxon	Relative Abundance (%)
Malacostraca	Amphipoda	Aoridae	*Grandidierella japonica*	23.93
Polychaeta	Spionida	Spionidae	*Streblospio benedicti*	13.22
Bivalvia	Myida	Myidae	*Mya arenaria*	5.58
Polychaeta	Spionida	Spionidae	*Boccardiella ligerica*	5.36
Malacostraca	Isopoda	Anthuridae	*Cyathura burbancki*	5.07
Polychaeta	Spionida	Spionidae	*Pygospio elegans*	5.01
Polychaeta	Spionida	Spionidae	*Marenzelleria viridis*	4.50
Clitellata (subclass Oligochaeta)	-	-	-	4.16
Polychaeta	Phyllodocida	Nereididae	*Alitta succinea*	3.93
Polychaeta		Capitellidae	*Mediomastus ambiseta*	2.96
Clitellata	Tubificida	Naididae	*Tubificoides* spp.	2.22
Malacostraca	Amphipoda	Unciolidae	*Unciola serrata*	2.11
Bivalvia	Mytilida	Mytilidae	-	2.05
Polychaeta	-	Capitellidae	*Heteromastus filiformis*	1.82
Anthozoa	-	-	-	1.77
Polychaeta	Spionida	Spionidae	*Polydora cornuta*	1.71
Polychaeta	Spionida	Spionidae	*Marenzelleria* spp.	1.37
Polychaeta	Terebellida	Terebellidae	*Polycirrus* spp.	1.37
Clitellata	Tubificida	Naididae	Tubificinae imm. w/ capilliform chaetae	1.08
Nemertea	-	-	-	0.97

East River

There has been a limited amount of benthic surveying in the East River over the last decade between Ward Island and Rikers Island; however, TDI surveyed the portion of East River near the Applicant's proposed submarine corridor (HDR-DTA 2010a). The benthic community in the assessed portion of the East River was composed of benthic invertebrate species that are tolerant to variable conditions including annelids and amphipods. The TDI benthic survey data indicate that diversity and evenness for the East River was relatively low (HDR-DTA 2010a). Furthermore, commonly observed benthic organisms that are associated with highly disturbed and polluted environments such as the East River are typically opportunistic species that can quickly repopulate a habitat (Mearns et al. 2015; HDR-DTA 2010a).

The 2022 benthic invertebrate survey for the Project examined benthic community composition within the proposed transmission line corridor in the East River. However, samples were limited due to challenges in sampling from rocky/gravelly substrate that is common in this area of the river. Based on preliminary data,[5] only six unique taxa were observed from a single station (BB-29). These six taxa are presented as relative abundance in Table 4-18. Total abundance was low with 2.67 ± 0.88 organisms/sample.

Table 4-18. Taxa Identified for Station BB-29 in the East River by Relative Abundance

Phylum/Class	Order	Family	Taxon	Relative Abundance (%)
Polychaeta	Phyllodocida	Microphthalmidae	*Microphthalmus aggregatus*	25
Malacostraca	Isopoda	Chaetiliidae	*Chiridotea coeca*	25
Clitellata	Tubificida	Naididae	*Tubificoides sp.*	12.5
Clitellata	Tubificida	Naididae	Tubificinae imm. w/ capilliform chaetae	12.5
Polychaeta	Phyllodocida	Nephtyidae	*Nephtys picta*	12.5
Malacostraca	Amphipoda	Phoxocephalidae	*Eobrolgus spinosus*	12.5

4.9.3 Existing Marine Finfish Resources

The term "marine finfish resources" refers to vertebrate fish species inhabiting the water column in and near the submarine corridor, including benthic/demersal life stages. The following section describes recent trends and status of the major commercial fishery species in the Hudson, Harlem, and East Rivers.

Hudson River

The Hudson River estuary extends for 243 km (151 mi) from the Troy Dam to the Battery on Manhattan Island, encompassing the tidally influenced section of the river (NOAA Fisheries 1999). Historically, the Hudson River estuary has been vital in supporting major commercial and recreational fisheries, and additionally serving as a major transportation corridor, and located in one of most densely populated metropolitan areas in United States (NOAA Fisheries 1999). Freshwater, diadromous, anadromous,

[5] Preliminary data received from the taxonomy laboratory has undergone laboratory quality assurance and quality control, but the draft report is in production.

estuarine, and marine species including alewife, striped bass, Atlantic sturgeon, bluefish, and bay anchovy are some of the few important fish species that dominate the Hudson River especially the waters of the lower Hudson River estuary (NOAA Fisheries 1999; Limburg 2006).

The diversity of fishes that occur in the Hudson River are due the influences of geography, oceanography and climate. Habitat variety is a product of mixing of water from rivers, straits, and the oceanic New York Bight. The range of salinity from the Bronx to Kingston and the influence of pronounced seasonally temperature changes are unique to the Hudson (Waldman et al. 2006). Overall, community density of fish species has varied over the decades based on variations in river flow between the summer and autumn months. Hurst et al. (2004) recorded 21 years of beach seine sampling in the Hudson River and encountered 60 species, with the most abundant species reported as silverside, striped bass, and American shad. Although species richness remained constant over those years; species composition and relative abundance has declined.

The Hudson River Biological Monitoring Program (HRBMP) is one of the longest running fish monitoring programs in the United States, dating back to the assessment of striped bass population and the potential impact of Cornwall pumped storage facility and the Indian Point nuclear generating station cooling system in late 1960s. Nieman et al. (2021) reviewed and evaluated shifts in fish abundance of striped bass, American shad, alewife, and blueback herring based on HRBMP data collected from the late 1960s until 2021. Nieman et al. (2021) reported a decline in overall abundance between 15-30% in beach seine surveys and fall juvenile surveys.

Two of the federally listed, anadromous fish species that spawn, mature and forage in the lower Hudson River estuary are shortnose and Atlantic sturgeon. Sturgeons are slow growing, long living fish that have suffered from historic overfishing and habitat modification. Atlantic sturgeon migrate up the Hudson River to spawn using the mid-estuary region above Stony Point, and shortnose sturgeon spawn primarily in the upper freshwater reaches from Coxsackie to Troy (USFWS 1997). Once targeted for their caviar, meat, and oil, both species are protected through fishery management efforts to preserve their numbers (Roustaian et al. 2015). It became illegal to possess Atlantic sturgeon from the Hudson River after their protection under the Endangered Species Act in 2012 (77 FR 5879). Shortnose sturgeon were protected under the Endangered Species Act in 1967 (32 FR 4001). Additional discussion of sturgeon is presented in Section 4.10.

American shad are another anadromous species that inhabit the Hudson River. Spawning for American shad occurs in the spring between Kingston and the Federal Dam at Troy and migration to the nearshores of the Atlantic Ocean occurs in the fall (NYSDEC 2010). At the start of the twentieth century, shad were the second-highest commercially harvested species on the Atlantic coast (ASMFC 2020). Following multi-decade cycles in the harvesting activity, New York State implemented a moratorium on both the commercial and recreational shad fisheries in 2010 due to continued recruitment failure observed in fishery-independent juvenile sampling (ASMFC 2020). Significant habitat loss resulting from dredging and destruction of nursey habitats from the mid-1800s to the mid-1900s contributed to a decline in abundance (NYSDEC 2010). The population of American shad is at its lowest levels ever recorded (Nack et al. 2019).

Striped bass, another anadromous species, use the Hudson River for spawning and the lower estuary is valued overwintering habitat for young-of-the-year (YOY) (Hurst and Conover 2002). Historically, striped bass supported a large commercial fishery in the Hudson River that peaked in the 1970s but collapsed a decade later from overfishing, habitat alteration, and contamination (Steve 2016). Since its collapse, the Hudson River population has increased in relative abundance, partly due to fishery management, but numbers are still below historic levels and now in decline again (Nack et al. 2019).

The finfish group named "river herring" in the Hudson River estuary consists of alewife and blueback herring. Like the previously discussed species in this section, river herring are anadromous, and spawn in all freshwater portions of the Hudson River and its tributaries (Eakin 2017). The group has been considered a species of concern under NOAA since 2007 but, upon review, was not placed on the endangered species list. Population numbers of river herring are closely observed by the Atlantic States Marine Fisheries Commission (ASMFC), since 2012 (ASMFC 2012). Small and highly regulated commercial harvests are carefully managed and recreational use is limited to mostly bait for larger fish.

Harlem River

Harlem River is a 9.3-mile (15-km) tidal strait that is hydrologically connected to the East River and the lower Hudson River estuary through Spuyten Duyvil Creek, a meandering stream supporting tidal marshes that flows around the northernmost tip of Manhattan. Its waters provide essential habitat for spawning, breeding, feeding, or growth for species such as bluefish, windowpane flounder, winter flounder, red hake, winter flounder, and Atlantic herring (NYC Parks 2018), as discussed further in Section 4.9.3.

A dam spanned the Harlem River for the first half of the nineteenth century, creating ideal habitat for, and therefore fishing for, striped bass, bluefish, weakfish, porgy, and flounder (Zeisel 1995). Despite recent cleanup efforts, NYSDEC still lists the Harlem River as a "Class 1" impaired waterbody (NYS 2020). In the Harlem River, commercial fishing for American eel and American shad is banned, an advisory against consumption of white and channel catfish is in place, and limitations are in place for consuming all other fish and crab meat (NYSDOH 2022). No indications of active commercial fisheries were discovered.

East River

The East River runs 25 km (16 mi) from the northern edges of the Upper New York Harbor to the western reaches of the Long Island Sound. The East River sits within one of the most culturally, historically, and ecologically diverse estuaries with a high amount of industrialization and associated increases and decreases of marine wildlife (Park et al. 2020).

East River fish are part of the larger community inhabiting the lower Hudson River Estuary. Woodhead (1993) reported more than 50 species of fish in the East River, with resident marine species comprising approximately 70% of the total number, and estuarine and migratory species each comprising approximately 15% of the rest of the species. Furthermore, due to its proximity to the lower Hudson River estuary nearly all species reported in East River are the same (Woodhead 1993).

During the period of April to December 2019, East River Ichthyological Alliance, composed of a network of environmental education organizations and performed a comprehensive study to explore fish diversity in the East River (Park et al. 2020). A total of 47 fish species comprising 9,729 individual fish were recorded from seining, trapping, and field observations. Specifically, a total of 22 fish species and 2,463 individuals were sampled by seining, trapping and pooled data from fishing clinics located near Randall's Island and Ward's Island. Observed fish included striped bass, bluefish, scup, and American eel.

4.9.4 Existing Freshwater Benthic Resources

The NYSDEC ERM indicates that the terrestrial transmission line corridor crosses three freshwater mussel screening streams: the East Branch Delaware River, Beaver Kill, and Neversink River, located at mileposts 26.7, 30.7, and 70.3, respectively. These streams correspond to the waterbodies identified through the Applicants' consultation with NYSDEC regarding freshwater mussels, with the addition of the Basher Kill (Primeau 2022), located at milepost 80.6. The SWAP identified 134 freshwater mussels as present in New York State, 55 of which the SWAP assessed. Of the 55 assessed species, the SWAP indicates that three

freshwater mussel species have the potential to be present within the terrestrial transmission line corridor based on HUC 10 watershed data: the alewife floater, brook floater, and dwarf wedgemussel.

Benthic macroinvertebrates are likely to be present in nearly all streams crossed by the terrestrial transmission line corridor. Species likely to be found in higher quality streams (i.e., Class A, B, C(t) include stonefly, mayfly, caddisfly, hellgrammite, water penny, gilled snail, scud, crayfish, alderfly, black fly, aquatic beetle, crane fly, dragonfly, damselfly, freshwater clam, and sow bug. Benthic macroinvertebrates likely to be found in other streams include water strider, backswimmer, midge, aquatic worm, leech, pouch snail, and mosquito.

4.9.5 Existing Freshwater Finfish Resources

New York State classifies freshwater finfish resources into coldwater and warmwater fish species. Coldwater fisheries typically require cool, clean water below 72°F. A total of 47 NYSDEC-mapped coldwater fishery streams are crossed by the terrestrial transmission line corridor, of which 46 are in Delaware and Sullivan Counties. The remaining mapped coldwater stream is crossed in Orange County. An additional 47 field delineated streams in Delaware and Sullivan Counties were assigned a water quality standard of trout or trout spawning based on NYSDEC guidelines.

While the NYSDEC water quality designations do not necessarily mean that trout and/or trout habitat is physically present within each coldwater fishery stream within the transmission line corridor, field observations indicate that many of the coldwater streams crossed by the corridor do support coldwater fish communities. Species potentially present within the coldwater fishery streams crossed by the corridor include brook trout, brown trout, and rainbow trout. Some of the streams crossed by the Project corridor that support trout and/or trout spawning habitat are considered world class fisheries due to their glacially derived steep slopes, bed-loads characterized by an abundance of boulders, cobbles, and gravel substrate that provides excellent spawning habitat with a fast and oxygenated stream flow, and with abundant vegetative shade and hydrologic connections to the local groundwater table, seeps, and springs to help maintain the cool thermal regime preferred by trout species. These premier trout streams flow through the relatively undisturbed watersheds of the southern Catskill Mountains and Northern Appalachians and are managed by NYSDEC to stock the local streams and regulate the States' fishery (see Section 4.9.7.2), while non-governmental groups are also very active in the area with local projects that support trout habitat restoration and re-connectivity within the local watersheds.

In addition to coldwater fisheries, species typical of warmwater fish communities that may be present in streams crossed by the corridor include largemouth bass, suckers, brown bullhead, channel catfish, madtoms, northern pike, various cyprinids and centrarchids. There are no public fishing rights (PFRs) on the warmwater fisheries within the corridor. Warmwater fishing and/or aquaculture operations may occur on private property adjacent to the proposed terrestrial transmission line corridor.

4.9.6 Existing Essential Fish Habitat and Habitat Areas of Particular Concern

The Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801) promotes the protection, conservation, and enhancement of Essential Fish Habitat (EFH) for those species actively managed under federal fishery management plans. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Magnuson-Stevens Fishery Conservation and Management Act requires all federal agencies to consult with NOAA Fisheries on all actions or proposed actions that are permitted, funded, or undertaken by the federal agency that may adversely impact designated EFH. Adverse impacts may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components.

According to NOAA's EFH Mapper, the waters within the Project corridor are designated as EFH for various life stages of 11 species (NOAA Fisheries 2021). The Project area also contains an HAPC for juvenile and adult summer flounder (*Paralichthys dentatus*). Table 4-19 lists the species and life stages with designated EFH and HAPC within the Project area and they are described in the following section.

Table 4-19. Designated Essential Fish Habitat within the Project Corridor

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
Atlantic herring *(Clupea harengus)*		X	X	X
Bluefish *(Pomatomus saltatrix)*			X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Longfin inshore squid (*Doryteuthis [Amerigo] pealeii*)	X	X	X	X
Red hake *(Urophycis chuss)*	X	X	X	X
Summer flounder *(Paralichthys dentatus)*[1]		X	X	X
Windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
Winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
Winter skate (*Leucoraja ocellata*)			X	X

Source: NOAA Fisheries 2021
Notes: Essential Fish Habitat includes potential Habitat of Particular Concern for summer flounder only.

4.9.6.1 Atlantic Butterfish

The Atlantic butterfish is a demersal/pelagic species ranging from the Gulf of St. Lawrence south to Florida (NEFSC 2004). Butterfish are found in the Mid-Atlantic shelf in the summer and fall but migrate to the edge of the continental shelf where they aggregate in response to seasonal cooling of water temperatures (Grosslein and Azarovitz 1982). The Project area contains designated EFH for all life stages of Atlantic butterfish.

Atlantic butterfish are broadcast spawners that spawn primarily in the evening or at night from June to August (Cross et al. 1999). Spawning may occur in the upper portion of the water column, and eggs were found between 0 to 4 m (0 to 13 ft) at night in the Mid-Atlantic Bight (Kendall and Naplin 1981). EFH for butterfish eggs comprises pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to the south shore of Long Island, New York, and is generally over bottom depths of 1,500 m (4,921 ft) or less (MAFMC 1995).

Atlantic butterfish larvae are found over bottom depths between 41 and 350 m (135 to 1,148 ft) where the average temperatures are 8.5 to 21.5°C (47.3 to 70.7°F) in the upper water column (<200 m [656 ft]; Cross et al. 1999). Larval Atlantic butterfish are believed to participate in diurnal vertical migrations; however, more larvae have been collected in the water column between 0 and 4 m (0 and 13 ft) at night than during the day (Kendall and Naplin 1981).

Small juvenile butterfish (<30 mm [1.2 inches]) are surface-dwelling, forming loose schools in association with flotsam and large jellyfish to avoid predation (Cross et al. 1999). Larger juvenile butterfish (>30 mm

[1.2 inches]) are found over sand and muddy substrate at depths between 10 and 265 m (33 and 869 ft) in water temperatures that range between 3 and 28°C (37 and 82°F; Cross et al. 1999).

Adult Atlantic butterfish are primarily found at bottom depths between 10 and 250 m (33 and 820 ft) where water temperatures are between 4.5 and 27.5°C (40.1 and 81.5°F) and salinities above 5 ppt (Cross et al. 1999).

Egg, larval, juvenile, and adult life stages of Atlantic butterfish are only expected to occur in the inshore waters of the submarine corridor during the spring and summer as this species migrates southward and offshore in response to falling water temperatures (MAFMC 2021).

4.9.6.2 Atlantic Herring

Atlantic herring is a schooling, pelagic, commercially important coastal species that ranges from northern Labrador to North Carolina in the western Atlantic Ocean (Bigelow and Schroeder 1953a). The Project area contains designated EFH for larval, juvenile, and adult life stages of Atlantic herring.

A very long larval stage (4 to 8 months) allows Atlantic herring to be transported long distances to inshore and estuarine waters where, in the spring, they become early-stage juveniles through metamorphosis (NEFMC 2017; NEFMC and NOAA Fisheries 2017). Atlantic herring larvae are observed between August and April, with peak abundances generally occurring from September through November (NEFMC 2017; NEFMC and NOAA Fisheries 2017).

Atlantic herring juveniles are found in pelagic and bottom waters that range in depth from 15 to 135 m (49 to 443 ft), at temperatures less than 10°C (50°F), and in salinities ranging from 26 to 32 ppt (Reid et al. 1999). At approximately 40 to 50 mm (1.6 to 2.0 inches), Atlantic herring larvae metamorphose into juveniles and begin schooling. Juvenile Atlantic herring do not migrate seasonally, but instead move during summer and fall to overwintering habitats in southern New England and throughout the Middle Atlantic Bight, where they stay in deep bays or near the bottom in offshore areas (Reid et al. 1999).

Adult Atlantic herring can be found in pelagic and bottom waters ranging in depth from 20 to 130 m (66 to 427 ft), with temperatures less than 10°C (50°F), and salinities that are greater than 28 ppt (Reid et al. 1999).

Based on this species' salinity and depth preferences, only larval and early-stage juvenile life stages of this species are expected to occur within the submarine corridor during the spring and summer.

4.9.6.3 Bluefish

Bluefish (*Pomatomus saltatrix*) are a coastal migratory pelagic species that can be found in inshore and offshore temperate and warm temperate waters of the continental shelf, ranging from Nova Scotia to Florida (Bigelow and Schroeder 1953a). In mid-to-late May, bluefish traveling in large schools migrate into Mid-Atlantic waters, returning to southeastern Florida in November (Stone et al. 1994). The Project area contains designated EFH for juvenile and adult life stages of bluefish.

Juvenile bluefish occur within the "mixing" and "seawater" zones in Mid-Atlantic estuaries from May through October (MAFMC 1998).

Bluefish adults can be found in oceanic, nearshore, and continental shelf waters and prefer temperatures of approximately 14°C (57°F) and salinities above 25 ppt (Fahay et al. 1999). The species migrate extensively

and are distributed based on season (Shepherd and Packer 2006). One predominant spawning area on the east coast for bluefish adults is the Middle Atlantic Bight during summer (Wilk 1982).

Based on this species' habitat preferences, only juvenile life stages of this species are likely to occur within the submarine corridor between May and November.

4.9.6.4 Clearnose skate

Clearnose skate (*Raja eglanteria*) occur along the eastern North American coast from the Nova Scotian Shelf to northeastern Florida as well as in the northern Gulf of Mexico from northwestern Florida to Texas (Bigelow and Schroeder 1953b; Robinson 1969; McEachran and Musick 1975; Stehmann and McEachran 1978). The Project area contains designated EFH for juvenile and adult life stages of clearnose skate.

Juvenile skates inhabit depths ranging from approximately 5 to 14 m (16 to 46 ft) in the spring and from 4 to 8 m (13 to 26 ft) in the summer. In the Raritan-Hudson estuary juveniles are typically observed during the warmer months. Depth range for juvenile clearnose skate occurrence in the estuary is between 5 to 7 m (16 to 23 ft) and salinity range between 22 to 30 ppt (NOAA Fisheries 2003).

Adult skates in the Hudson-Raritan estuary are most abundant during summer, particularly near the channels. Adult depth distribution during that season is between 5 and 16 m (16 to 52 ft), with most found between 5 and 8 m (16 to 26 ft). Estuary salinities during adult clearnose skate occupation range between 23 to 30 ppt, with peaks at 25 and 27 ppt (NOAA Fisheries 2003).

Both juvenile and adult life stages of clearnose skate are expected to occur within the submarine corridor during the summer months.

4.9.6.5 Little skate

Little skate (*Leucoraja erinacea*) range from Nova Scotia to Cape Hatteras and is a dominate species within the demersal fish community of the northwest Atlantic (Bigelow and Schroeder 1953a; Richards et al. 1963; McEachran and Musick 1975; Michalopoulos 1990). Its center of abundance is in the northern section of the Mid Atlantic Bight and on Georges Bank, where it is found year-round over almost the entire range of temperatures recorded for those areas (McEachran and Musick 1975). The Project area contains designated EFH for juvenile and adult stages of little skate.

Juveniles are 93 to 102 mm (3.7 to 4.0 inches) TL when they hatch (Richards et al. 1963; McEachran 2002) and are fully developed, resembling the adult form in both shape and coloration. Within the Raritan-Hudson estuary, little skate occur year-round and exhibit seasonal onshore/offshore movements. In the spring, they are heavily concentrated along the Mid-Atlantic Bight and found mostly on the inner continental shelf. Little skate are most abundant on transitional and sand bottom substrates (Gottschall et al. 2000).

Adult little skates have an average size of 41 to 51 cm (16 to 20 inches) and are found in depths ranging from 5 to16 m (16 to 52 ft), with most occurring at 7 m (23 ft). Adults are found in a wide range of salinities between 20 to 34 ppt, but peak abundances occur at distinct salinity bands roughly between 25 to 27 ppt, between 29 to 30 ppt, and at 34 ppt. They are typically found in sandy or gravelly bottoms, where they remain buried in depressions during the day; and they are increasingly active at night.

Both juvenile and adult life stages of little skate are expected to occur within higher salinity waters of the submarine corridor during the summer months.

4.9.6.6 Longfin Inshore Squid

The longfin inshore squid is a pelagic, schooling species that can be found from Newfoundland to the Gulf of Venezuela and is considered commercially important (Cargnelli et al. 1999). Longfin inshore squid are known to migrate seasonally, moving south and offshore in the late fall and wintering on the continental shelf edge (Cargnelli et al. 1999). The Project area contains designated EFH for all life stages of longfin inshore squid.

Like most squids, longfin inshore squids produce egg masses that are demersal and anchored to the substrates on which they are laid. Females typically deposit the gelatinous capsules of eggs in depths less than 50 m (164 ft) to different substrate types, including shells, fish traps, boulders, SAV, sand, and mud (MAFMC 2011).

EFH of juvenile longfin inshore squid is considered pelagic habitats in inshore and offshore continental shelf waters from Georges Bank to South Carolina, in the southwestern Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, and Raritan Bay (MAFMC 2011).

EFH of adult longfin inshore squid is pelagic in inshore and offshore continental shelf waters and within the same embayments as juvenile longfin inshore squid (MAFMC 2011).

Juvenile and adult longfin inshore life stages are only expected to potentially occur in the southern extent of the proposed corridor within the Hudson River, while eggs may occur throughout the submarine corridor.

4.9.6.7 Red Hake

Red hake can be found from Nova Scotia to North Carolina (Bigelow and Schroeder 1953a). The Project area contains designated EFH for all life stages of red hake.

Red hake eggs and larvae EFH are pelagic habitats in the Gulf of Maine and in the Mid-Atlantic. Eggs can be found on the inner continental shelf near the surface due to their buoyancy (Steimle et al. 1999b).

Larval stages of red hake can be found in surface waters at depths of 200 m (656 ft) or less (Steimle et al. 1999b). Red hake larvae distribution is not known to be associated with a substrate type (Stone et al. 1994).

Once red hake larvae reach 35 to 40 mm (1.4 to 1.6 inches) in length, they sink to the bottom on fine, silty sands at depths approximately 100 m (328 ft) or less, where they take shelter in depressions in the substrate (Bigelow and Schroeder 1953a). Structures, shell fragments, and sea scallops provide shelter for older juveniles found in bottom habitats at less than 100 m (328 ft) deep.

Preferring bottom habitats of sand and mud with depressions, adult red hake can be found in depths ranging between 30 to 130 m (98 to 427 ft; Steimle et al. 1999b). At two years of age, red hake reach sexual maturity and peak spawning occurs during June and July off Long Island, Georges Bank, and the New York Bight (Grosslein and Azarovitz 1982).

Based on this species' habitat preferences, egg, larval, and juvenile live stages of red hake are expected to occur within the submarine corridor.

4.9.6.8 Summer Flounder/Habitat Area of Particular Concern

The Project area contains designated EFH for larval, juvenile, and adult life stages of summer flounder.

SAV within the Project area would be considered an HAPC for summer flounder (*Paralichthys dentatus*). Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within areas designated as adult and juvenile summer flounder EFH (NOAA Fisheries 2021).

The pelagic summer flounder larvae are found over the inner and outer continental shelf and are transported to estuarine nursery areas by currents. Larvae occur across a wide range of salinities, but are most often captured in the higher salinity portions of estuaries. Larvae occur in water from 0 to 23°C (32 to 73°F), but are most abundant between 9 and 18°C (48 and 64°F). In the Middle Atlantic Bight, larvae are found at depths from 10 to 70 m (33 to 231 ft). Greater densities of young fish were found in or near inlets (Packer et al. 1999).

Juvenile summer flounder use estuarine habitats as nursery areas, including seagrass beds, in water temperatures greater than 2.8°C (37°F) and salinities ranging from 10 to 30 ppt (NOAA Fisheries 2021a). Offshore-migrating juveniles return to coastal waters and bays in the spring, and generally stay for the entire summer. Juveniles can be found on mud and sand substrates in flats, channels, salt marsh creeks, and eelgrass beds (Packer et al. 1999).

Adults normally inhabit shallow coastal and estuarine waters during the warmer months of the year and remain offshore during colder months on the outer continental shelf (NOAA Fisheries 2021a). Adult summer flounder usually return inshore to coastal waters of the New York Bight in April and reach their peak abundance during the warm summer months of July and August. Adults are often found in the high salinity portions of estuaries and have been reported as preferring sandy habitats. They can also be found in a variety of habitats with both mud and sand substrates, including marsh creeks, seagrass beds, and sand flats (Packer et al. 1999).

During a pre-application call on January 26, 2022, NOAA Fisheries Greater Atlantic-Regional Fisheries Office (GARFO) staff (J. Murray) noted that SAV beds in the Hudson River north to the Troy Dam serve as habitat for summer flounder. Within the submarine corridor SAV is mapped just south of the Newburgh-Beacon Bridge and adjacent to Charles Point. Charles Point is located approximately 6 km (4 miles) north of Haverstraw Bay and the Newburgh-Beacon Bridge is approximately 34 km (21 miles) north of Haverstraw Bay. Salinities between 10 and 30 ppt are generally limited to the portions of the Hudson River south of Haverstraw Bay. Therefore, juvenile summer flounder are not likely to be abundant in the vicinity of these locations within mapped SAV.

4.9.6.9 Windowpane Flounder

The windowpane flounder is a left-eyed flatfish species abundant from Georges Bank to Chesapeake Bay and is distributed in the northwest Atlantic Ocean from the Gulf of St. Lawrence south to Florida (Cheng et al. 1999). The Project area contains designated EFH for all life stages of windowpane flounder.

Typically, windowpane flounder are found in shallow sandy bottom habitats within estuaries, nearshore waters, and the continental shelf. The species is abundant on Georges Bank in waters less than 60 m (197 ft) between late spring and fall, but overwinters in waters up to 366 m (1,200 ft) deep (Chang et al. 1999; Hendrickson 2006).

Spawning for the windowpane flounder occurs throughout most of the year, peaking in May in the Middle Atlantic Bight and in fall in the southern portion of the Middle Atlantic Bight (Chang et al. 1999). While spawning takes place at or near the water bottom, windowpane flounder eggs are buoyant and rise into the water column where development occurs (Chang et al. 1999).

The windowpane flounder can grow to 0.5 m (1.5 ft) in length, although it typically grows from 25 to 30 cm (10 to 12 inches) long (Fish Base n.d.[b]). It is a fast-growing species, particularly in the spring and summer seasons with sexual maturity occurring at 3 to 4 years of age (Chang et al. 1999).

Based on this species' habitat preferences, all life stages of windowpane flounder may occur within the submarine corridor.

4.9.6.10 Winter Flounder

Winter flounder (*Pseudopleuronectes americanus*) are common in the lower reaches of the Hudson River (Pereira et al. 1998), but populations have declined since a period of peak landings in the 1980s (Collier et al. 2014). The Project area contains designated EFH for all life stages of winter flounder.

Adult winter flounder are thought to return to natal spawning grounds in inshore shallow waters during winter and spring (NOAA Fisheries n.d. [e]). Their eggs are generally present in very shallow waters (less than approximately 5 m [16 ft]), at water temperatures of 10°C (50°F) or less, and salinities ranging from 10 to 30 ppt (Pereira et al. 1998). Based on a preliminary review of bottom salinities within the Hudson River using the New York Harbor Observing and Prediction System (Stevens Institute of Technology 2021) for representative late-winter periods (January to March), salinities between 10 and 30 ppt are generally limited to the portions of the Hudson River south of Haverstraw Bay. The types of substrate where eggs are found include sand, muddy sand, mud, and gravel, although sand seems to be the most common. Winter flounder larvae are most abundant at temperatures of 2 to 15°C (36 to 64°F) and at salinities of 3.2 to 30 ppt (Pereira et al. 1998). Preferred larval habitat consists of fine sand or gravel bottoms in inshore waters shallower than 5 m (16 ft).

As mentioned above, the approximately 32-km (20-mile) portion of the proposed transmission line route north of Haverstraw Bay is unlikely to function as ideal nursery habitat due to low salinity. However, during a pre-application call on January 26, 2022, NOAA Fisheries GARFO staff (J. Murray) noted that waters of the Hudson River north to approximately Poughkeepsie are considered to have salinity levels suitable for some winter flounder life stages. Larvae are initially planktonic but become increasingly bottom-oriented as metamorphosis approaches. Demersal eggs and less-mobile larvae would be unable to relocate to avoid construction-related disturbances.

Water quality and substrate characteristics within much of the submarine corridor are typical for all life stages of winter flounder.

4.9.6.11 Winter Skate

The winter skate occurs from the south coast of Newfoundland and the southern Gulf of St. Lawrence to Cape Hatteras (Packer et al. 2003). Like the little skate, winter skate are highly abundant in the northern section of the Mid-Atlantic Bight. The Project area contains EFH for juvenile and adult winter skate life stages.

Winter skates are fully developed at hatching. EFH for juvenile winter skate includes subtidal benthic habitats in coastal waters extending from eastern Maine to Delaware Bay, as well as on the continental shelf in southern New England and the Mid-Atlantic region. EFH for juvenile winter skate occurs on sand and

gravel substrates, but they are also found on mud from the shoreline to a maximum depth of 90 m (295 ft; NEFMC and NOAA Fisheries 2017).

EFH for adult winter skates includes subtidal habitats in coastal waters in the southwestern Gulf of Maine, in coastal and continental shelf waters in southern New England and the Mid-Atlantic region, and on Georges Bank. EFH includes depths of 80 m (262 ft), estuaries and bays, which includes Great South Bay and Barnegat Bay, and occurs on sand and gravel substrates, as well as mud substrates (NEFMC and NOAA Fisheries 2017).

Both juvenile and adult life stages of winter skate are expected to occur within higher salinity waters of the submarine corridor.

4.9.7 Existing Commercial and Recreational Fishing

4.9.7.1 Submarine Corridor

Both commercial and recreational fishermen (including charter boats) use the Hudson River to catch species that are drawn to the productive estuary. Popular fishing targets of the Hudson River within the Project area include striped bass, river herring, American eel, and blue crab. Diadromous and anadromous fish populations can be particularly vulnerable to fishery collapse due to the large geographical scale and environments needed to complete essential portions of their life cycle. Distribution ranges from fresh- to saltwater often cross multiple jurisdictional borders, complicating management.

The commercial fisheries of the Hudson River have been a vital and dynamic part of New York's economy and livelihood since the eighteenth and nineteenth centuries where a variety of finfish were targeted for harvesting. Target species included American shad, Atlantic sturgeon, and striped bass, each highly valued and found through the lower Hudson River estuary as far as Stony Point and East and Harlem Rivers (Waldman et al. 2006). Fishing for striped bass historically occurred in the East and Harlem Rivers as well (Waldman et al. 2006). However, historical fisheries on the Hudson River, such as the anadromous striped bass, sturgeon, and American shad, were closed due to population collapse and contamination concerns (Waldman et al. 2006).

The commercial portion of the striped bass fishery in the Hudson River was closed in 1976 due to PCB contamination and has yet to reopen (ASMFC 2019). However, recreational fishing for striped bass using hook and line remains a popular activity on the river and is mostly catch-and-release. Approximately 31.1% of recreational anglers fishing on the Hudson River target striped bass (Normandeau Associates 2003). The season for striped bass (north of the George Washington Bridge) opens on April 1st and continues through November 30th with a daily limit of 1 fish (NYSDEC 2022k). The catch and release of striped bass in freshwaters is estimated to cause 15% mortality (ASMFC 2019). The 2019 ASMFC stock assessment for striped bass concluded that the species is in decline throughout the east coast (ASMFC 2019). Frequented shore locations within the Project area for recreational fishing of striped bass include Pete and Toshi Seeger Riverfront Park/Long Dock Park/Dennings Point in Beacon, New York, which are across the river from the northernmost portions of the transmission corridor, as well as Plum Point Park in New Windsor, New York (Fish Hudson Valley 2021). Of the catches recorded by the recreational Striped Bass Cooperative Angler Program, which records members' catches north of the George Washington Bridge, 588 were legal in 2021 and 64 were kept (NYSDEC 2022l). Catch per unit effort of striped bass per hour was the lowest since 2016 (NYSDEC 2022l). Peak abundances of catches reported were in April and November of 2021 (NYSDEC 2022l). Several charter fishing companies exist throughout the Hudson River that provide striped bass trips during the season and tournaments for the largest striped bass caught are held.

The American shad fishery in New York closed in 2010 (Nack et al. 2019). The Atlantic sturgeon fishery in the Hudson River was closed in 1998 (63 FR 182). The first formal step to managing striped bass came in the form of a fisheries management plan published in 1981, however it was non-mandatory and ineffective as the ASMFC did not have any regulatory authority at the time (Essig et al. 2019). As cleanup efforts have progressed, human consumption of fish harvested in the Hudson River south of Catskill is suggested only for women and men over 50 and to limit to once per month for most species and once per week for marine species.

The commercial and recreational fishing season for river herring opens on March 15 and closes on June 15 (NYSDEC n.d. [f]). Recreational harvesting of river herring in the Hudson River is allowable with dip nets, small seines (<36 square ft), or scap or lift nets (NYSDEC 2022k). A small portion of recreationally harvested herring is for consumption, with the larger portion used as bait for striped bass fishing (NOAA Fisheries 2019). The recreational limit for river herring in the Hudson River is 10 fish per day or 50 fish per boat (NOAA Fisheries 2019). For the river herring commercial fishery, there is no restriction on seine, fyke, hoop, or trap net size, but gillnets and dip/scoop net sizes are regulated (NYSDEC 2022k). Catch per unit effort for commercial harvest for river herring has increased since 2010 (NOAA Fisheries 2019). Normandeau Associates (2003 and 2007), estimated recreational catches of river herring at 93,157 fish in 2001 and 152,117 fish in 2005.

The harvesting of shellfish has been of great commercial and recreational importance to the broader Hudson River region dating back to the eighteenth and nineteenth centuries. Especially within the lower Hudson River estuary, eastern oysters (*Crassostrea virginica*) were once an abundant estuarine resource, as evidenced by the presence of numerous prehistoric oyster shell middens (mounds of discarded shells) left along the shores of the Hudson by indigenous peoples (Carbotte et al. 2003). However, due to urbanization, overharvesting, the impacts on overall water quality from power plants, and the persistence of contaminants (e.g., PCBs) there has been a sharp decline in recreational and commercial harvesting of economically important invertebrates including quahogs, soft shell clams, blue crabs, eastern oysters, and blue mussels (Levinton and Waldman 2006).

The blue crab fishery in the Hudson River employs pots in summer and dredges in the winter months that catch crabs overwintering and buried in the sediment (Chenery 2002). Commercial landings of blue crab in New York have fallen from 206 metric tons in 2019 to 94 metric tons in 2021 (NOAA Fisheries n.d.). The number of crabs caught in the Hudson River is a small fraction of the total New York landings. Further, New York landings are smaller than those caught in other states, like Virginia and Delaware (UMCES 2011). Recreational landings are not reported, but pots and trotlines are the most commonly employed recreational fishing tactics in targeting blue crabs. Known locations for blue crab fishing in the Project area include Piermont, Governor Cuomo Bridge, and Stony Point. Though blue crabs can be caught year-round in the Hudson River, fishing for them is most common and successful in the late summer and early fall when numbers peak. There are no commercial shellfish harvest zones within the Project area and, pursuant to 6 NYCRR § 41.1, shellfish lands in Westchester, Rockland, Bronx, New York, and Queens counties crossed by the submarine corridor are uncertified and prohibited from taking shellfish for consumption due to sanitary conditions (NYSDEC n.d.).

4.9.7.2 Terrestrial Corridor

NYSDEC uses a set of five management categories to define coldwater fisheries management objectives: stocked, stocked extended, wild, wild quality, and wild premier. The criteria for assigning management categories to stream reaches are listed in Table 4-20 for wild trout management categories and in Table 4-21 for stocked trout management categories (NYSDEC 2020b).

Table 4-20. Criteria for Wild Trout Management Categories

	Wild	Wild Quality	Wild Premier
Access	Public access	Public access	Significant access – at least 3 cumulative miles of reach length in one or more of the following: • Public fishing rights • Public land • Public fishing permitted by landowner • Adequate angler parking
Size	Not applicable	Mean width >10 feet	Mean width > 20 feet
Stream Reach Quality (Trout Carrying Capacity)	Meets C(T) or higher water quality standard or data exists to support C(T) classification	• Wild trout biomass >40 lbs/acre or • ≥300 yearling or older trout/mile	• wild trout biomass>60 lbs/acre or ≥500 yearling or older trout/mile • abundance of wild trout ≥9 inches • potential to catch memorable fish (12 inches ST, 15 inches RT or BT)
Angler Use	Not applicable	Not applicable	Reach can physically and biologically accommodate moderate to high angler use (>150 hr/acre)

Table 4-21. Criteria for Stocked Trout Management Categories

	Stocked	Stocked Extended
Access	Access by one or more of the following: • Public fishing rights easements • Public land • Public fishing permitted by landowner	Significant access – at least 3 cumulative miles of reach length in one or more of the following: • Public fishing rights • Public land • Public fishing permitted by landowner • Adequate angler parking
Size	Mean width >10 feet	Mean width >20 feet
Stream Reach Quality (Trout Carrying Capacity)	• Survival to end of May • Does not already support adequate fisheries for black bass or walleye, even though technically a trout stream • Must meet BP standard	• Reach conditions offer potential for spring-stocked trout to survive into summer • Temperatures generally suitable for regular stocking through mid-June or for two consecutive months • Must meet Bs standard
Angler Use	>75 hours/acre	>150 hours/acre

The proposed terrestrial transmission line corridor crosses three NYSDEC-categorized trout streams with their associated management regulations for trout fishing as summarized in the following section.

Beaver Kill

Beaver Kill, located at milepost 30.7, is categorized as stocked-extended and is stocked with brown trout four times, once every two weeks starting the third week in April for a total of 2,540 stocked fish. Additional fishing regulations include catch and release only and artificial lures only, with angling from Iron Bridge

at Horton downstream to the first Route 17 overpass prohibited from July 1 through August 31 to protect thermally stressed trout. Stream access, also known as PFRs, are present on both the right and left descending banks of Beaver Kill. The proposed corridor crosses both PFRs.

East Branch Delaware River

East Branch Delaware River, located at milepost 26.7, is categorized as wild premier and is not stocked. Trout fishing regulations include catch and release only and artificial lures only from October 16 through March 31, and a daily limit of one of any size trout from April 1 through October 15. No stream access or public parking is present within the proposed corridor. The nearest PFRs are approximately 0.25 miles downstream of the corridor crossing on the right descending bank.

West Branch Delaware River

West Branch Delaware River, located at milepost 2.3, is categorized as stocked-extended and is stocked with brown trout four times, once every two weeks starting the third week in April for a total of 16,880 stocked fish. Additional fishing regulations include catch and release only and artificial lures only from October 16 through March 31, and a daily limit of three trout with no more than one longer than 12 inches from April 1 through October 15. PFRs are present on both the right and left descending banks of West Branch Delaware River at the proposed corridor crossing. The nearest public parking areas is approximately 1.7 river miles upstream at Sherwood Road.

Aside from PFRs on the above streams, there are additional public coldwater fishing opportunities within the proposed corridor on lands administered by NYCDEP. Access is gained through a valid NYCDEP access permit (NYCDEP 2019b). In Delaware County, the proposed corridor crosses both the Bagley Brook and Basin Clove units, where fishing is permitted within the existing ROW (NYCDEP 2022).

Besides these publicly accessible properties, both coldwater and warmwater fishing opportunities exist on private lands throughout the proposed corridor. In general, most of these opportunities are found along the existing NYPA Marcy South ROW; access to most other streams is restricted by highway/road ROWs.

There is no commercial fishing activity in the terrestrial transmission line corridor.

4.9.8 Fisheries and Benthic Resource Impacts and Mitigation

4.9.8.1 Marine Benthic Potential Impacts and Proposed Mitigation

Construction activities such as trenching, dredging, and anchoring would directly disturb benthic habitat. The Applicant assumes 100% mortality for any sessile and infaunal benthic organisms within the area of direct benthic disturbance. Sediment would be expected to quickly fill in depressions to restore natural gradients and predominant grain size. The benthic communities are expected to begin recolonizing the affected areas quickly (i.e., days to weeks) following disturbance, and are expected to recover naturally within 1 to 5 years following disturbance. Indirect impacts on predators due to the loss of benthic community prey species are expected to be temporary and insignificant given the extent of similar foraging habitat in the immediate vicinity of the area that would be disturbed by the Project activities.

Trenching activities associated with construction of the Project would increase suspended sediment within the water column. This temporary and localized increase in suspended sediment and associated turbidity may have short-term, minor impacts on benthic species near the trenching activities, e.g., due to sensory disturbance or interference with gill function. Sessile benthic and epibenthic species may also be impacted

by deposition of suspended sediments within approximately 200 ft (61 m) of the trench based on the results of sediment modeling (see Section 4.8.4).

Residual heat is lost to the surrounding environment when transmitting energy via a transmission cable (Taormina et al. 2018). Burial depth and sediment type directly affect temperatures immediately surrounding the cable (Emeana et al. 2016). Within the submarine corridor, the proposed transmission line will typically be buried several feet below the riverbed surface and, where such burial depth cannot be achieved, the cable will be armored to provide protection that also helps to minimize heat effects. Temperature increases in the top layer of sediment are expected to be negligible and temperatures at the sediment-water interface will be further reduced due to the rapid heat dissipation from water and currents. Therefore, residual heat from the proposed transmission line is not anticipated to impact benthic habitats.

Vessel strikes are not known to be a common cause of injury or mortality to benthic resources.

4.9.8.2 Marine Finfish Potential Impacts and Proposed Mitigation

Trenching activities associated with construction of the Project would increase suspended sediment within the water column. This temporary and localized increase in suspended sediment and associated turbidity may have short term, minor impact on fish species near the trenching activities, e.g., due to sensory disturbance or interference with gill function. Certain fish life stages may also be impacted by deposition of suspended sediments within approximately 200 ft (61 m) of the trench based on the results of sediment modeling (see Section 4.8.4). BMPs on construction such as time-of-year restrictions would be observed to avoid or minimize disturbance to migratory species. While temporary disturbance of individual fish may occur, the construction activities would not create a barrier to fish migration.

Juvenile and adult winter flounder that may be present in the Project area would likely temporarily avoid the immediate areas where construction activity is occurring, opting for other suitable habitat within the rivers. Demersal eggs and less mobile larvae would not be able to relocate to avoid construction-related disturbances. As mentioned above, the approximately 20-mile portion of the proposed transmission line corridor that is north of Haverstraw Bay is not likely to function as ideal nursery habitat for winter habitat due to low salinity. However, during a pre-application call on January 26, 2022, NOAA Fisheries GARFO staff (J. Murray) noted that waters of the Hudson River north to approximately Poughkeepsie are considered to have salinity levels suitable for some winter flounder life stages. The Applicant assumes 100% mortality for any winter flounder eggs present within the direct area of riverbed disturbance. Immobile eggs and less mobile larvae in the immediate area of sampling locations that occur within preferred egg and larval habitat may be subject to impacts from sediment disturbance; however, any increase in turbidity would be localized and temporary. Deposition greater than 0.25 inch is likely to result in mortality of winter flounder eggs (Berry et al. 2011). The Applicant acknowledges NYSDEC and/or NOAA Fisheries recommended time-of-year work restrictions for winter flounder south of Haverstraw Bay are expected to be December 15 through May 31, although other species and resource concerns may have conflicting time-of-year restrictions that will need to be resolved in the Certificate conditions. Additionally, dredging in areas with elevated (Class C) sediments, if any, would be performed using an environmental bucket to minimize resuspension of contaminants and reduce associated risk of uptake by fish and benthic organisms.

In-water noise would be generated during construction activities, mainly from jetting, plowing, trenching or localized dredging for cable installation. The in-water noise is not expected to exceed the NOAA Fisheries noise-injury threshold for fish (183 dB re 1 µPa2-s cumulative sound exposure level [SELcum] for fish less than 2 grams and 187 dB re 1 µPa2-s SELcum for fish 2 grams or greater). Based on NOAA Fisheries guidance, behavioral effects are possible above 150 dB re 1µPa root mean square (RMS); however, effects would be temporary and would diminish or cease once the installation equipment and/or organism has moved away from the area. Johansson and Andersson (2012) recorded underwater noise levels

generated during a comparable operation involving pipelaying and a fleet of nine vessels. Mean noise levels of 130.5 dB re 1 µPa were measured at 1,500 m from the source. Reported noise levels generated during a jet trenching operation provided a source level estimate of 178 dB re 1 µPa-m measured at 1 m from the source (Nedwell et al. 2003). Reported sound levels of clamshell dredges include 176 dB re 1 µPa-m (BC MoTI 2016) and 107 to 124 dB re 1 µPa at 154 m (~500 ft) from the source with peak frequencies of 162.8 Hz (Dickerson et al. 2001; McQueen et al. 2019). Maximum levels occurred when the dredge bucket made contact with the channel bottom in mixed coarse sand or gravel (McQueen et al. 2019; Dickerson et al. 2004).

Additionally, the Project's submarine corridor is subject to frequent noise disturbance from vessel traffic. According to 2017 Automatic Identification System (AIS) data, there are more than 1,500 vessel trips per year throughout the Project corridor, which does not include smaller vessels that do not use AIS transponders. Underwater noise generated from vessels varies depending on vessel size and speed, generally with larger vessels and faster speeds producing greater source levels (Kipple and Gabriele 2007). Underwater noise levels of 157 to 182 dB re 1 µPa-m at 3 ft (0.9 m) have been documented for vessels ranging from 14 to 962 ft (4 to 293 m) in length operating at 10 knots or less (Kipple and Gabriele 2007). In comparison, Port Coeyman and Port Albany facilities along the Hudson River north of the submarine corridor accommodate vessels up to 750 ft (229 m) in length (COWI North America, Inc. 2017; Port of Albany n.d.). Therefore, 157 to 182 dB re 1 µPa-m at 3 ft (0.9 m) is representative of the underwater noise levels that can be expected from the range of vessels transiting through the submarine corridor at up to 10 knots; louder noise may be generated by faster vessels. This frequent vessel-related background noise is expected to reduce fish sensitivity to the construction noise.

If present, juvenile and adult fish are highly mobile and would likely move to undisturbed areas during construction activities. Therefore, Project-related in-water noise is not expected to exceed the NOAA Fisheries noise-injury threshold of fish. Behavioral disturbance of certain fish, including sturgeon, may occur close to work vessels where noise levels exceed 150 dB re 1 µPa RMS. However, such Project-related disturbance would be localized and temporary. Noise impacts are discussed further for more sensitive and protected species in Section 4.10.

EMFs are generated around submarine HVDC cables (Hutchison et al. 2018), but the strength of the field drops rapidly with distance. Certain fish such as sturgeon, sharks, and rays are sensitive to EMFs (CSA Ocean Sciences and Exponent 2019). For example, a 2016 field study assessed the potential effect of EMF generated by the Cross Sound Cable system on the little skate (*Leucoraja erinacea*), an electrosensitive species (Hutchison et al. 2018). The Cross Sound Cable system includes a bipolar (bundled two-cable) HVDC transmission line buried at a depth of approximately 6.6 ft (2 m) across Long Island Sound. The results indicated that skate behavior was significantly affected by the EMF generated by the buried line; for example, the skates travelled a greater distance and made larger turns in proximity to the energized cable compared to a control area (Hutchison et al. 2018). However, the EMF did not present a barrier to skate mobility. It is possible that, over time, such marine organisms may become habituated to the EMF generated by an HVDC cable. For example, studies have shown that dogfish sharks can learn to avoid signals that are not associated with food (CSA Ocean Sciences and Exponent 2019). Further, Klimley et al. (2017) detected no effect on migrating Chinook salmon smolt (*Oncorhynchus tshawytscha*) or adult green sturgeon (*Acipenser medirostris*) from the 200-kV HVDC Trans Bay Cable in the San Francisco Estuary over a 7-year study. Therefore, species sensitive to EMF may be affected by the presence of the proposed transmission line but are not expected to be adversely impacted. Other fish species that are not sensitive to EMF are not expected to be significantly affected. See Section 4.10 for further discussion of EMF effects with respect to sturgeon.

Vessel strikes are not known to be a common cause of injury or mortality to the fisheries described in the preceding sections.

4.9.8.3 Freshwater Benthic and Finfish Resources Potential Impacts and Proposed Mitigation

Impacts to freshwater fish and benthic habitat (i.e., streams and riverine resources) are discussed in Section 4.7.5. As stated in Section 4.7.5, the Applicant is currently evaluating the feasibility of trenchless crossings for all State-protected stream crossings, which includes all the coldwater and warmwater streams. Impacts to freshwater fish and benthic species would be avoided where trenchless crossings are employed. Where dry-ditch methods are used to cross streams, some direct impacts will occur to coldwater and warmwater fish species. While most finfish will depart the workspace on their own at the start of in-water work activities, some limited mortality may occur when individual fish become stranded within the workspace as it is dewatered. For these dry-ditch crossings, and within the narrow workspace zone (i.e., approximately 50 ft wide across the stream channel) there will also be mortality of any sessile and benthic organisms such as macroinvertebrates and freshwater mussel species. No population-level impacts to any freshwater fish or benthic species will occur from the proposed stream crossings, regardless of crossing methods used.

The Applicant will minimize impacts to coldwater and warmwater fisheries by following NYSDEC time-of-year restrictions associated with in-water work windows to the maximum extent possible. In general, in-stream work will not be undertaken from September 15 through May 31 in coldwater fisheries and March 15 through July 15 in warmwater fisheries.

4.9.8.4 Essential Fish Habitat Potential Impacts and Proposed Mitigation

The impacts outlined in the benthic and finfish section have corresponding impacts on EFH. For example, as noted above, SAV is considered an HAPC for juvenile and adult summer flounder, and it serves as important habitat for other aquatic organisms. Within the submarine corridor, SAV is mapped south of the Newburgh-Beacon Bridge and adjacent Charles Point, in areas that will be crossed using HDD methods. As discussed in Section 4.8.4, Project-related sediment disturbance will generate elevated TSS levels, which may extend into areas of SAV depending, in part, on the final transmission line route alignment and burial depth within the corridor. Survival thresholds for various SAV species range between 15 to 42 mg/l, however these were conducted over extended periods on the order of weeks to months (Dennison et al. 1993; Bartleson et al. 1999; Sánchez et al. 2014). Preliminary modeling for the Project suggests TSS concentrations outside the Project corridor could reach 50 mg/l for a period of 10-12 hours in any given area, such that the Applicant expects impacts on existing SAV beds would generally be avoided, and any unavoidable effects from elevated TSS concentrations would likely be negligible. The modeling results will be revised based on the results of the Applicant's fall 2022 sediment survey to help confirm this assessment. In the unexpected event that SAV is damaged during installation of the cable, the Applicant anticipates that it would recover within months to years following construction as surrounding SAV spreads through rhizomatous growth into the footprint of disturbance. Any permanent loss of existing SAV bed habitat attributable to the Project would be mitigated.

Any vessel positioning impacts (anchors or spuds) may temporarily disturb benthic resources and fisheries, but impacts would be localized and outside SAV beds to the extent practicable, such that they are expected to recover quickly (weeks to months).

Though cable burial is the preferred protection technique, the Project would potentially convert localized areas of soft bottom habitat to hard bottom in areas where cable and pipeline crossings, as well as areas where sufficient burial depth cannot be achieved, as mentioned above. Cable protection could be one of or a combination of rock, rock bags, concrete mattresses, or geotextile mattress. The amount placed around each submarine cable will be based on a variety of factors, including water flow and substrate type (hydrodynamic scour modeling), and potential other uses (e.g., commercial fishing or other maritime activities). Final design details will be provided in the EM&CP. Over time (weeks to months), the areas

with scour protection are likely to be colonized by sessile or mobile organisms (e.g., sponges, hydroids, and crustaceans). This results in a modification of the benthic community in these areas from primarily infaunal organisms (e.g., amphipods, polychaetes, and bivalves). Hard-bottom habitat and vertical structures in a soft-bottom habitat can create artificial reefs, thus inducing the "reef" effect (Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans. Given the likely limited area where cable armoring is necessary, any negative impacts to species losing soft bottom habitat would be so small as to not be meaningfully measurable.

The Project would conduct an EFH assessment as part of the USACE application and as part of the required consultation with NOAA Fisheries.

4.9.8.5 Commercial and Recreational Fishing Impacts and Proposed Mitigation

Temporary impacts described during construction in the previous sections for marine benthic resources and marine finfish in the Project area, such as disturbance, turbidity, and noise, have corresponding impacts to commercial and/or recreational fishing targeting impacted species in the Hudson River. However, commercial fishing in the Project area is very limited. Additionally, commercial and/or recreational fishermen may experience temporary exclusion from the immediate area of installation during construction. To mitigate this potential impact, a Notice to Mariners would be published 30 days prior to allow for advanced notice and planning.

Long-term impacts to commercial and recreational fishing in the Hudson River from the Project would stem from changes in habitat. At the limited existing utility crossings where burial is not possible, armament with hardened structures would be required over the cable. While this could negatively impact bottom-oriented fisheries such as bottom trawls or pots by snagging gear, it could also result in positive impacts to shell fisheries where species depend on hard bottom for colonizing or propagation. As mentioned in the marine finfish section, the structure created by armament can attract new species and build a community different than exists for soft-bottom habitat, also known as the reef effect. Recreational fishing is known to particularly benefit from the reef effect, providing new, high value fishing locations. Mitigation for negative impacts to commercial and/or recreational fishing in the Hudson River related to habitat conversion includes using proper cable burial as the primary installation method and providing exact coordinates and mapping of armament locations for charts, as required by USCG.

Construction of the proposed transmission line across the three streams with public fishing rights, the West Branch Delaware River, East Branch Delaware River, and Beaver Kill, is not expected to significantly restrict public fishing access because the Applicant plans to cross each waterbody using trenchless methods. Recreational fishermen will be allowed to fish and pass through the crossing locations. During active construction, there will be visual and noise impacts associated with the crossings that may cause fisherman to temporarily avoid the immediate area, but fishing access and safe egress will be maintained throughout construction.

On NYCDEP properties, as well as private lands where there are fishable coldwater fisheries, there may be temporary displacement of recreational fishing due to construction activities. The extent and duration of displacements will depend on the size of the crossings and crossing methods employed.

Operation of the proposed transmission line will not affect access to or the quality of freshwater fishery resources.

4.10 Protected Species and Important Habitats

Pursuant to 16 NYCRR § 86.5, this section describes protected species and important habitats that have been observed, or have the potential to occur, in or near the Project area, and discusses potential impacts to those protected species and important habitats resulting from the construction, operation, and maintenance of the Project. This section also describes the proposed Project-specific measures proposed by the Applicant to avoid, minimize, and/or mitigate potential impacts to protected species and important habitats.

4.10.1 Protected Species and Important Habitats Studies and Analysis

Protected species and important habitats in the Project vicinity were reviewed using a combination of desktop analyses of publicly available data, technical reports, and scientific literature; targeted field surveys; and agency correspondence.

Protected species include species listed under the ESA, New York's State Endangered Species Act and its implementing regulations, ECL§ 11-0535 6 NYCRR Part 182, as well as other protections such as the Bald and Golden Eagle Protection Act of 1940, the Migratory Bird Treaty Act, the Marine Mammal Protection Act of 1972, and the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended. Important habitats include designated critical habitats under the ESA, EFH under the Magnuson-Stevens Fishery Conservation and Management Act, and other State-designated and mapped sensitive habitat areas.

A Natural Heritage Database inquiry was submitted to NYSDEC Division of Fish and Wildlife on August 9, 2021, to determine potential New York State and federally protected wildlife species likely to be present in or near the Project area, with a response received from the NYNHP on October 6, 2021 (Conrad 2021).

An official Species List was also obtained from the USFWS IPaC project planning tool to identify threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitats that may be present within or in the immediate vicinity of the Project area. Relevant agency correspondence is provided in Appendix A: Agency Correspondence to this Exhibit.

4.10.2 Protected Species in the Project Area: Existing Conditions

4.10.2.1 Terrestrial Wildlife and Plants Existing Conditions

Two federally and state-listed bat species (Rayman-Metcalf 2021; Conrad 2021) may occur within the terrestrial transmission line corridor:

- Indiana bat (*Myotis sodalis*) listed as endangered (42 FR 47840 47845, Recovery Plan: USFWS 2007); and
- Northern long-eared bat (*Myotis septentrionalis*) listed as threatened (80 FR 1900 1922, Recovery Plan: N/A).

Ten federally and/or state-listed T&E bird species (USFWS 2021; Conrad 2021) may occur within portions of the terrestrial and submarine corridors:

- Endangered roseate tern (*Sterna dougallii* [Northeast U.S. nesting population]) (52 FR 42064 42068, Recovery Plan: N/A);
- Threatened piping plover (*Charadrius melodus* [Atlantic Coast and Northern Great Plains populations]) (49 FR 44712, Recovery Plan: USFWS 1988, 2016);

- Threatened red knot (*Calidris canutus rufa*) (79 FR 73705 73748, Recovery Plan: USFWS 2021);
- State-threatened bald eagle (*Haliaeetus leucocephalus*) (USFWS 2022) (Conrad 2021);
- State-threatened northern harrier (*Circus hudsonius*) (Conrad 2021);
- State-threatened upland sandpiper (*Bartramia longicauda*);
- State-endangered peregrine falcon (*Falco peregrinus*);
- State-endangered golden eagle (*Aquila chrysaetos*) (USFWS 2022a);
- State-threatened pied-billed grebe (*Podilymbus podiceps*); and
- State-threatened least bittern (*Ixobrychus exilis*).

Two federally and/or state-listed threatened reptile species may occur within portions of the corridor:

- Threatened bog turtle (*Clemmys muhlenbergii*) (62 FR 59605 59623, Recovery Plan: USFWS 2001); and
- Threatened timber rattlesnake (*Crotalus horridus*) (Conrad 2021).

Two federally and state-listed endangered freshwater bivalve species may occur within portions of the terrestrial corridor:

- Endangered dwarf wedgemussel (*Alasmidonta heterodon*) (55 FR 9447 9451Recovery Plan: USFWS 1993); and
- Brook floater (*Alasmidonta varicosa*) (Primeau 2022).

Three federally and/or state-listed T&E plant species may occur within portions of the terrestrial corridor:

- Threatened seabeach amaranth (*Amaranthus pumilus*) (58 FR 18035 18042, Recovery Plan: USFWS 1996);
- Threatened small whorled pogonia (*Isotria medeoloides*) (47 FR 39827 39831, Recovery Plan: USFWS 1992); and
- Endangered musk root (*Adoxa moschatellina*) (Conrad 2021).

Sixteen additional state-listed T&E plants may occur in proximity to the submarine corridor (Conrad 2021):

- Threatened spongy-leaved arrowhead (Sagittaria montevidensis ssp. spongiosa);
- Endangered stalked bugleweed (*Lycopus rubellus*);
- Endangered New England bulrush (*Bolboschoenus novae-angliae*);
- Threatened eastern grasswort (*Lilaeopsis chinensis*);
- Threatened marsh straw sedge (*Carex hormathodes*);
- Threatened Davis' sedge (*Carex davisii*);
- Threatened smooth beggar ticks (*Bidens laevis*)
- Threatened clustered sedge (*Carex cumulata*)

- Threatened great plains flat sedge (*Cyperus lupulinus ssp. lupulinus*)
- Threatened violet wood sorrel (*Oxalis violacea*)
- Endangered water pigmyweed (*Crassula aquatica*)
- Endangered yellow flat sedge (*Cyperus flavescens*)
- Threatened terrestrial water starwort (*Callitriche terrestris*)
- Threatened annual saltmarsh aster (Symphyotrichum subulatum var. subulatum)
- Threatened single-glumed spike rush (*Eleocharis uniglumis*); and
- Endangered northern shore quillwort (*Isoetes septentrionalis*).

Bats

Indiana bat

The Indiana bat is listed as endangered both federally and in New York State by reference to the federal listings. The Indiana bat is a small mammal, roughly 2 inches long, weighing between 0.2 and 0.3 ounces. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines from about November through March. For hibernation, the bats require cool, humid caves with stable temperatures under 50°F but above freezing. Very few caves within the range of the species have these conditions. The hibernacula typically have large volumes of Indiana bats and often have large rooms and vertical or extensive passages (USFWS 2022). In spring, Indiana bats disperse from their winter hibernacula, some dispersing hundreds of miles. They feed solely on insects. During the summer, females congregate at nursery colonies, known as maternity roosts, to raise their pups in colonies of between 50 and 100. Maternity roosts are typically found in riparian zones, bottomland, floodplain habitats, wooded wetlands, and upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (USFWS 2007). Males spend their summer preparing for the fall breeding season. In August or early September, Indiana bats swarm outside the entrance of caves and mines, at which time mating occurs. Females store the sperm over the winter while they hibernate and fertilize the egg in the spring. In New York State, hibernation can start as early as September and extend nearly to June (NYSDEC 2022m).

USFWS defines Indiana bat known habitat, also known as "occupied habitat," as suitable habitat within a 2.5-mile radius around known roost trees, a 5-mile radius around acoustic survey occurrences and/or mist-netting captures without radio-telemetry data, a 5-mile radius of priority 3 and priority 4 hibernacula, and a 10-mile radius around priority 1 and priority 2 hibernacula (USFWS 2009). Suitable summer habitat for Indiana bats is defined by USFWS as a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 ft (305 m) of other forested/wooded habitat.

NYNHP indicates the Project is within proximity of Indiana bat maternity colonies in Sullivan and Orange Counties (Conrad 2021). Consultation with USFWS shows that approximately 20 known Indiana bat roost trees occur within 2.5 miles of the terrestrial transmission corridor, all located within Orange County (Rayman-Metcalf 2021). In addition, the USFWS predictive model identifies several locations along the

proposed corridor within Orange County from New York Route 30 to the Newburgh-Beacon Bridge, as well as the entire terrestrial transmission line corridor within Westchester County where Indiana bats may occur. No known Indiana bat hibernacula are proximate to the corridor (Rayman 2021), which from a regulatory perspective is defined as being no closer than 10 miles from priority 1 or priority 2 hibernacula, and no closer than 5 miles from a priority 3 or priority 4 hibernacula (USFWS 2009).

Northern long-eared bat

The northern long-eared bat (NLEB) is listed as threatened both federally and in New York State. Additionally, the species is currently proposed for federal reclassification to endangered status (87 FR 16442), for which the final determination is expected in November 2022. NLEB typically weigh between 0.2 and 0.3 ounces and have a wingspan of 9 to 10 inches. During the winter months, NLEBs hibernate in caves and mines with large passages and entrances, constant temperatures and high humidity, and no air currents. During the summer months, they roost in a variety of shelters, including under tree bark, in cavities, or in crevices of both live and dead trees, rarely roosting in structures such as barns and sheds. They are considered to be more solitary than other members of the Myotis genus and are typically found in groups containing less than 100 individuals, with maternity colonies averaging 20 to 30 individuals. Pups are typically born between late May and late July, becoming volant (able to fly on their own) 18 to 21 days after birth. NLEB typically forage on forested hillsides and ridges rather than in streamside and floodplain forests. They also feed by gleaning motionless insects off vegetation and water (Harvey et al. 2011; USFWS 2015). In New York, prior to 2006, NLEB were frequently detected in the forests of every county of the state except for the five counties of New York City (NYSDEC 2022n).

USFWS defines NLEB known habitat, also known as "occupied habitat," as suitable habitat within a 1.5-mile radius around known roost trees, a 3-mile around acoustic survey occurrences and/or mist-netting captures without radio-telemetry data, and a 5-mile radius of known hibernacula (USFWS 2014). USFWS defines suitable summer habitat for NLEB as a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 ft (305 m) of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat.

NYNHP indicates the Project is within proximity of NLEB hibernacula within Sullivan and Orange Counties (Conrad 2021). Through consultation with USFWS, it was determined that there are no NLEB roost trees known to occur within 1.5 miles of the terrestrial transmission line corridor; however, two acoustic survey records occur within 2 miles of the corridor in Sullivan County and one acoustic survey record is within 0.5-mile of the corridor in Orange County. In addition, one known NLEB hibernaculum and occurring capture is within 5 miles of the corridor in Orange County (Rayman-Metcalf 2021). Besides these areas known to contain NLEB, the USFWS predictive model identifies the portion of the proposed corridor between NY Route 30 in Hancock and the Newburgh-Beacon Bridge as having the potential to have NLEB present (Rayman-Metcalf 2021).

Birds

Roseate tern

The northeast U.S. nesting population of roseate tern is listed as endangered both federally and in New York State. In northeastern North America, more than 90% of the breeding population is concentrated into a few colonies between Cape Cod and Long Island. In the northeastern United States, they nest on small islands with the common tern (*Sterna hirundo*) (NatureServe 2022). In New York State, this species breeds only in a few Long Island colonies, primarily Great Gull Island, which accounts for approximately 87% of the New York State population (NYSDEC 2022o). The terns begin to arrive at the breeding grounds at the end of April with the earliest eggs typically being laid in the third or fourth week of May. A complete clutch is typically 2 to 3 eggs. In the New York-Massachusetts area, young are fed almost exclusively American Sand Lance (*Ammodytes americanus*) (Spendelow 1995). The terns typically forage over open water, often in tidal channels, tide rips, drift lines, or over shoals/sandbars (NatureServe 2022).

Portions of the terrestrial transmission line corridor in Queens and the Randall's Island East and Lawrence Point landfalls are within the range of the roseate tern (USFWS 2022). However, no portions of the corridor or landfall sites contain sandy beach habitat that would support roseate tern nesting. As such, any roseate tern present in the Project area would be limited to transient individuals searching for or utilizing open water foraging areas.

Piping plover

The Atlantic Coast and Northern Great Plains populations of piping plover are listed as federally threatened and as endangered in New York State. They occur along the Atlantic Coast from southwestern Newfoundland and southeastern Quebec south to North Carolina, and on inland beaches from eastern Alberta and Nebraska to Lake Ontario. Within New York, this species breeds on Long Island's sandy beaches from Queens to the Hamptons, in the eastern bays and in the harbors of northern Suffolk County. (NYSDEC 2022p) They are small shorebirds that weigh between 1.5 and 2.25 ounces and measure between 5.5 and 7 inches long. During breeding season, they have a black band on their neck and forehead and their beak becomes orange with a black tip. They begin to arrive in the breeding grounds in New York around March and stay through August when they migrate to their wintering grounds. Between May and June, the females will normally lay four and sometimes up to five eggs (Audubon n.d.[a]). They forage on a broad range of invertebrates, such as worms, insect larvae, beetles, and small shellfish. The piping plovers that breed in the New York City area primarily winter in South Carolina (Wildlife NYC 2022).

Portions of the proposed terrestrial transmission line corridor in Queens and the Lawrence Point landfall and southern converter station sites are within the range of the piping plover (USFWS 2022). However, no portions of the corridor or landfall sites contain sandy beach habitat that would support piping plover nesting. As such, any piping plover present in the Project area would be limited to transient individuals flying overhead or using open water to forage.

Red knot

The red knot is listed as federally threatened and as endangered in New York State. They breed in the Canadian artic and most individuals winter at the southern tip of South America. In New York, red knot occurs along the salt meadows and mudflat of the South Shore of Long Island in both spring and fall, numbering more than 1,000 individuals; they are also present on Long Island in winter. Red knot was listed as federally threatened in 2014 due to declines in horseshoe crab populations, and to challenges resulting from climate change and coastal development (NYSDEC 2022j).

Portions of the proposed terrestrial transmission line transmission corridor in Queens and the Lawrence Point landfall and southern converter station sites are within the range of red knot (USFWS 2022). However, no portions of the corridor or landfall sites contain salt meadows or mudflat habitat that would support red knot presence.

Bald eagle

The bald eagle is a state-listed threatened species. Although no longer federally listed as threatened (USFWS 2007), bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). Bald eagles prefer undisturbed areas near large lakes and reservoirs, marshes and swamps, or stretches along rivers where they can find open water and fish. Wintering grounds are from southern Canada south, along major river systems, in intermountain regions, and in the Great Plains (NYSDEC 2022q).

According to bald eagle NYNHP data provided by NYSDEC, the terrestrial transmission line corridor crosses two known winter bald eagle concentration areas, one along the Neversink River and a second on Croton Point Peninsula. The proposed submarine transmission line corridor crosses three separate known winter bald eagle concentration areas and is just outside a fourth. The known winter bald eagle concentration areas that are crossed are the perimeter of Constitution Island, the entire stretch of the Hudson River from the Bear Mountain Bridge to Indian Point, and off the tip of Croton Point Peninsula. The proposed submarine transmission line corridor is less than 200 ft (61 m) outside a known winter bald eagle concentration off Sloop Hill State Unique Area in Cornwall-on-Hudson (Sandrow 2022). Observations of bald eagles have also been reported in other portions of the transmission line corridor including New York City, northern Manhattan, western Bronx, and Randall's Island (eBird 2022a).

According to bald eagle NYNHP data provided by NYSDEC, no documented bald eagle nests are located within the proposed terrestrial transmission line corridor. Three nests, two of which were active in the most recent dataset, are located within 1 mile of the proposed terrestrial transmission line corridor: two are near the Newburgh-Beacon Bridge landfall (approximately 0.5 miles from the corridor), one of which was active in the most recent dataset while the other is a previous nest of the same pair of birds, and another on Croton Point Park (approximately 0.25 miles from the corridor). Ten nests, six of which were active in the most recent dataset, are located within 1 mile of the submarine transmission line corridor: nine of which are more than 0.5 miles from the corridor, while one active nest is approximately 300 ft (91 m) from the submarine transmission line corridor near Manitou Marsh.

Northern harrier

The northern harrier is listed as state threatened. Northern harrier nests are found in dense vegetation or situated in a slightly elevated position. The clutch averages five eggs. Northern harriers breed in North America from northern Alaska and Canada south to central and southern California, Mexico and portions of the southern United States excluding the southeast region. Breeding occurs in freshwater and brackish marshes, tundra, fallow grasslands, meadows, and cultivated fields (NYSDEC 2022r).

NYNHP data indicate northern harriers may occur along the terrestrial transmission line corridor in Orange County (Conrad 2021). Northern harriers typically use fields or other suitable habitat that are greater than 25 acres of contiguous habitat. Such areas do not occur along the NYPA Marcy South ROW portion of the corridor in Orange County. It is unlikely that northern harriers would use the section of the corridor within the I-84 median due to the long, narrow nature of the highway corridor and extensive adjacent traffic, or the remainder of the Project corridor due to absence of suitable habitat. In addition, during agency consultation it was determined that grassland bird surveys were not necessary because the transmission line will have no permanent impact on habitat, which will be restored after construction.

One incidental northern harrier observation was made within the corridor on November 11, 2021, during wetland surveys. A female northern harrier was observed at two separate instances about 5 minutes apart flying along the edge of a small agricultural field, exhibiting foraging behavior, along the edge of the NYPA ROW in Ferndale, New York. Furthermore, eBird has documented numerous contemporary northern harrier sightings in the vicinity of the proposed corridor at the Croton Point Park in Westchester County. These sightings have occurred throughout the year but consist primarily of spring, fall, and winter observations, with few if any observations recorded during the breeding season (eBird 2022b). The landfill cap on Croton Point Park adjacent to the proposed corridor as well as surrounding wetlands provide suitable nesting habitat for this species.

Upland sandpiper

The upland sandpiper is listed by New York State as threatened. It leaves New York for wintering grounds by mid-September. The bird has a breeding range that extends from southern Canada through the central plains, from the Rocky Mountains east to the Appalachian Mountains. Populations in the northeastern United States are declining due to loss of grassland habitats (NYSDEC 2022s).

NYNHP data indicate upland sandpipers may occur along the terrestrial transmission line corridor in Orange County (Conrad 2021). Upland sandpipers typically use fields or other suitable habitat that are greater than 25 acres of contiguous habitat. Such areas do not occur along the NYPA Marcy South ROW portion of the corridor in Orange County. It is unlikely that upland sandpipers would use the section of the corridor within the I-84 median due to the long, narrow nature of the highway corridor and extensive adjacent traffic, or the remainder of the Project corridor due to absence of suitable habitat. In addition, during agency consultation it was determined that grassland bird surveys were not necessary because the transmission line will have no permanent impact on habitat, which will be restored after construction.

eBird has historical observations of upland sandpipers at Croton Point Park. The most recent sightings were from September 10, 2020; August 17 and 18, 2019; July 27, 2015; and April 13, 2012 (eBird 2022c). These sparse sightings indicate that upland sandpipers are only occasional visitors to Croton Point Park.

Peregrine falcon

The peregrine falcon is listed by New York State as endangered. Nesting areas are typically an unlined scrape on a cliff ledge or rocky outcrop. They may use abandoned raven or hawk nests as well as man-made structures such as bridges and tall buildings. The bird primarily feeds on birds ranging in size from medium-size songbirds up to small waterfowl. The current peregrine falcon range includes the Adirondacks; the New York City area on buildings and bridges; the Hudson Valley on bridges and cliffs; and scattered urban sites in Rochester, Buffalo, Binghamton, and Albany on buildings and bridges. The range has expanded in recent years (NYNHP 2022a).

According to NYNHP data, the peregrine falcon is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur along the length of the submarine corridor and in adjacent areas, particularly along the Hudson River shoreline and on bridges.

Golden eagle

The golden eagle is a state-listed endangered species, and it prefers remote mountainous areas with open habitat where small game is abundant, and cliffs are available for nesting. One area in Dutchess County has been consistently occupied by 1 to 4 wintering eagles since the early 1970s, and another was found more recently (NYNHP 2022b).

According to NYNHP data, the golden eagle is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur along the length of the submarine corridor and in adjacent areas, particularly along the Hudson River shoreline and on bridges. Additionally, USFWS provided radio telemetry data that show numerous golden eagles are documented crossing the proposed terrestrial transmission line corridor in Delaware and Sullivan Counties (Sullivan 2022).

Pied-billed grebe

The pied-billed grebe is listed as threatened by New York State. The bird inhabits quiet marshes, marshy shorelines of ponds, shallow lakes, or marshy bays. A mix of emergent vegetation and open water is ideal for this species. As a breeding species, the pied-billed grebe occurs statewide, with concentrations on the Lake Ontario Plain and St. Lawrence Valley. It is more sparsely distributed in the Adirondacks, Catskills, Allegheny uplands, and on Long Island. Areas of high winter concentrations include southern and central Texas, Great Salt Lake, Lake Mead, and the San Joaquin Valley. The highest overall counts of wintering grebes occurs on the Tennessee River in northeastern Alabama. It is a rare but regular winter visitor, more common on the coast, but also lingering fairly regularly in open water areas on the Allegany and Oswego Rivers, and at Dunkirk Harbor in Chautauqua County (NYNHP 2022c).

According to NYNHP data, the pied-billed grebe is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. No suitable habitat for this species is present on or in immediate proximity to any of the landfall sites.

Least bittern

The least bittern is listed as threatened by New York State. The least bittern spends most of its time in dense grass-like vegetation and subsists on small fish, salamanders, tadpoles, frogs, leeches, slugs, crayfishes, dragonflies, shrews, and mice. In New York, least bitterns tend to breed in shallow or deep emergent marshes, freshwater tidal marshes (lower Hudson River), or brackish tidal marshes (Long Island). They prefer stands of cattails or bulrush with bur-reed, sedges, or common reed. Least bitterns are restricted to the Lake Ontario and St. Lawrence plains and the Lower Hudson River Valley with some records from Long Island (NYNHP 2022d).

According to NYNHP data, the least bittern is potentially present in Orange, Dutchess, Rockland, Putnam, and Westchester Counties. It may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. No suitable habitat for this species is present on or in immediate proximity to any of the landfall sites.

Reptiles

Bog turtle

The bog turtle is listed as federally threatened and as endangered in New York State. Bog turtles are New York's smallest turtle, reaching a length of 4.5 inches. Bog turtles emerge from overwintering sites by mid-April. Overwintering sites are typically found in densely vegetated areas often in association with tree roots and other submerged structures along streams or underground springs. Abandoned muskrat lodges and other wetland burrows may be used. Bog turtles emerge when air and water temperatures exceed 50 degrees Fahrenheit. The bog turtle is found in scattered separate colonies in the eastern United States from New York and eastern Massachusetts, south to eastern Tennessee and northwestern Georgia. The species is semi-aquatic preferring habitat with cool, shallow, slow-moving water with deep mucky soils, and tussock-forming vegetation (NYSDEC 2022t).

Through consultations with USFWS, it was determined that bog turtles may be present in two distinct portions of the terrestrial transmission line corridor in Orange County. The first area is between US209 in Cuddebackville and Pocototello Road in Middletown (excluding areas above 1,000 ft [305 m] in elevation). The second area is along the I-84 corridor started just east of the Goshen Turnpike in Walkill to NY-17 in Newburgh (Rayman-Metcalf 2021). USFWS recommended Phase 1 bog turtle habitat surveys in these portions of the corridor.

The Applicant conducted Phase I bog turtle habitat surveys in the above areas in March and the first half of April 2022. Two wetlands were found to contain suitable bog turtle habitat (LaBella 2022). The Applicant then conducted a Phase 2 presence/absence survey of these wetlands in late April and May 2022. Consistent with the USFWS protocols, the two wetlands were each searched for over five hours on four separate occasions under favorable weather conditions, greater than 55º F under sunny or cloudy conditions. Surveys may be done when it is sunny or cloudy. Surveys can be conducted during and after light rain, provided air temperatures are above 65º F. Surveys were conducted on April 22, May 5, 10, and 17, 2022. No bog turtles were found to be present in either wetland (LaBella 2022). As such, bog turtles are not expected to be present within the terrestrial transmission line corridor. The Phase I and II bog turtle survey reports are provided in Appendix J: Bog Turtle Survey Reports to this Exhibit.

Timber rattlesnake

The timber rattlesnake is listed by New York State as threatened (NYSDEC 2022u). They are active between late April and mid-October. Mating season begins in the early summer and continues into early fall. During this time, males are especially active and can be found using basking and gestating habitat looking for receptive females. Timber rattlesnakes give birth to live young following a gestation period of 4 to 5 months. Females give birth every 3 to 5 years between late August and mid-September. Timber rattlesnakes are long-lived and reproduce at a low rate, making for slow population growth (NYSDEC 2022u). Their habitat includes mountainous and hilly deciduous or mixed deciduous- coniferous forests often with rocky outcroppings, steep ledges, and rockslides. This species' preferred habitat for basking, shedding, gestating, and birthing is open canopy and rocky areas while their preferred habitat for foraging is generally within forested habitat surrounding the den.

NYNHP data indicate timber rattlesnakes may occur along the terrestrial transmission line corridor in Sullivan County (Conrad 2021). The existing NYPA Marcy South ROW in Sullivan County has the potential to provide suitable denning, gestation, and denning habitat for timber rattlesnakes because of the open nature of the cleared ROW as well as the rocky outcroppings present. Based on the New York State Amphibian and Reptile Atlas, timber rattlesnakes are most likely present in the southeastern portion of Sullivan County (NYSDEC 2022v). During consultation with NYSDEC, the Applicant indicated that no timber rattlesnake surveys would be conducted, but rather construction monitors would be employed within NYNHP timber rattlesnake buffer areas.

Bivalves

Dwarf wedgemussel

The dwarf wedgemussel (DWM) is listed as endangered at both the state and federal levels. DWM are small freshwater mussels that rarely exceed 1.5 inches in length. They spend most of their time almost completely buried in the bottom of streams. Habitat for the DWM includes running water of all sizes. Preferred bottom substrates include silt, sand, and gravel and stream flow velocity, where present, is usually slow to moderate. The species appears to select or at least be tolerant of low levels of calcium in the water (NYSDEC 2022w).

USFWS and NYSDEC identified the Neversink River and Basher Kill crossings as the two crossings of concern for DWM during meetings on December 7, 2021, and January 5, 2022. Both agencies recommend that surveys should be completed for these waterbodies as part of the consultation process. The Applicant plans to conduct mussel surveys for these crossings during the appropriate time prior to construction. The Applicant will continue consulting with USFWS and NYSDEC regarding DWM survey timing and protocols.

Brook floater

The brook floater is listed by New York State as threatened (NYNHP 2022e). Brook floaters are small subtrapezoidal to subovate mussels. The outermost shell is greenish, with dark green color rays. The inner shell is bluish white. Like many bivalves, The outermost shell is greenish, with dark green color rays. The inner shell is bluish white. Like many bivalves, brook floater are small freshwater mussels that rarely exceed 1.5 inches in length. They spend most of their time almost completely buried in the bottom of streams. Habitat for the brook floater is strictly a running water, favoring gravelly riffles in creeks and small rivers. Larvae (glochidia) of this species are parasitic on the gills of several fish species including Blacknose and Longnose Dace, Golden Shiners, Pumpkinseeds, Yellow Perch, Slimy Sculpins, and the Margined Madtom. Adults are filter feeders (NYNHP 2022e).

NYSDEC identifies the East Branch of the Delaware River, Beaverkill, and Neversink River crossings as the three crossings of concern for brook floater (Primeau 2022). NYSDEC recommends that surveys should be completed for these waterbodies as part of the consultation process. The Applicant plans to conduct mussel surveys for these crossings during the appropriate time prior to construction. The Applicant will continue consulting with NYSDEC regarding brook floater survey timing and protocols.

Plants

Seabeach amaranth

This plant is listed as threatened at both the federal and state levels. Seabeach amaranth occurs on barrier island beaches between the foredune and wrack line and on open overwash areas behind the foredune. Its range in New York is restricted to Long Island from Coney Island to near the east end of the South Fork along the south shore (NYNHP 2022f). Based on field reconnaissance surveys, no suitable habitat for this species is present within the transmission line corridor or at the landfall sites.

Small whorled pogonia

The small whorled pogonia is federally and state listed as threatened. The species grows in a variety of upland, mid-successional, wooded habitats, usually older hardwood and mixed stands of beech, birch, maple, oak, and white pine. It prefers acidic soils with a thick layer of dead leaves and sparse to moderate ground cover and often occurs on slopes near small streams (USFWS 2022).

Small whorled pogonia was identified by USFWS as potentially occurring in Orange County (Rayman-Metcalf 2022). USFWS indicates that presence/absence surveys should be completed for small whorled pogonia in any portions of the Project in Orange County where upland forest with open understory will be cleared. The Applicant will complete presence/absence surveys for small whorled pogonia in Orange County, as necessary, once construction workspace has been developed and if the need for any clearing of suitable habitat is identified. Per USFWS guidelines, the surveys will be conducted during the flowering period of mid-May to mid-June.

Musk root

Musk root is listed as endangered by New York State. Musk root is a clump forming plant of moist rocks often near the base of cliffs in rich woods, around cold air vents along lower portions of talus slopes, on red sandstone ledges and hillsides and in shallow soil on rock ledges. In New York State, musk root is only known from three populations in the Catskill Mountains (NYNHP 2022g).

NYNHP data indicate the terrestrial transmission line corridor bisects one of the three known populations in New York State in Delaware County on Trout Brook Mountain in a hemlock-northern hardwood forest (Conrad 2021). The record for this element occurrence is from 1985, with no additional observations since that time (Conrad 2021; Ring 2022). The 1985 observations coincide with pre-construction surveys performed for the NYPA Marcy South transmission line which was constructed in 1986.

The Applicant completed field surveys in May and June 2022 to determine presence/absence of musk root in the area identified by NYSDEC NYNHP in proximity to the corridor. None of the hemlock-northern hardwood forest community type referenced in the NYNHP response was observed within or adjacent to the corridor near the edge of the NYPA ROW. Further, while some of the associated species identified by the NYNHP as growing in proximity to musk root (NYNHP 2022g) were observed, such as striped maple (*Acer pensylvanicum*), wild sarsaparilla (*Aralia nudicaulis*), black birch (*Betula lenta*), prickly gooseberry (*Ribes cynosbati*), and elderberry (*Sambucus canadensis*), no musk root populations were identified. The Applicant's surveyors consulted with NYSDEC's chief botanist to evaluate potential musk root identifications. All plants identified by the field surveyors as possible musk root were confirmed by the state botanist to be other species (Ring 2022). According to NYSDEC, musk root is most likely to be present in shaded, protected microhabitats (Ring 2022), and although it is possible to be found in some spots on the NYPA ROW, it would more likely be within the forested area. Based on the survey conducted in 2022, musk root does not appear to be present within the NYPA Marcy South ROW. If additional workspace is required outside the NYPA Marcy South ROW, additional surveys may be warranted.

Spongy-leaved arrowhead

The spongy-leaved arrowhead is listed as threatened by NYSDEC. This plant is an annual herbaceous plant that grows in tidally flooded areas. The plant is often entirely above water at low tide and mostly or entirely submerged at high tide. The species is found in freshwater to brackish intertidal mud flats. In New York, the species is restricted to estuaries along the Hudson River from south of Albany to north of the Mario Cuomo Bridge (NYNHP 2022h).

According to NYNHP data, spongy-leaved arrowhead is potentially present along the Hudson River Shore below Camp Smith as well as along the mouth of Moodna Creek at the Hudson River, West Point Military Academy, Constitution Marsh, and Iona Island Marsh. The submarine corridor is greater than 700 ft (213 m) away from each of these locations.

Stalked bugleweed

Stalked bugleweed is listed as endangered by New York State. This plant is found in marshes, fens, and flooded swamps. In New York the species is extant in the Lower Hudson Valley and Long Island (NYNHP 2022i).

According to NYNHP data, stalked bugleweed is potentially present at West Point Military Academy, west of the railroad track. The submarine corridor is greater than 100 ft (30 m) from this known population.

New England bulrush

New England bulrush is listed as endangered by New York State. This plant is found in brackish marshes along tidal creeks and rivers. This species occurs from western Long Island and New York City to the lower Hudson River Valley (NYNHP 2022j).

According to NYNHP data, New England bulrush is potentially present at Con Hook tidal marsh and mudflats, Iona Island Marsh, and Croton River. The submarine corridor is approximately 500 ft (152 m) east of Con Hook tidal marsh and mudflats, 1/3-mile northeast of Iona Island Marsh, and 1.5 miles southwest of the Croton River.

Eastern grasswort

Eastern grasswort is listed as threatened by New York State. This species occurs in brackish marches, intertidal mudflats, borders of salt marshes and other muddy locations with brackish or salt water influences. The plant is found on brackish areas of the Hudson River and eastern Long Island (NYNHP 2022k).

According to NYNHP data, the species is potentially present at Con Hook, Piermont Marsh, and along Croton River. The submarine corridor is approximately 500 ft (152 m) east of Con Hook tidal marsh and mudflats, nearly a mile from the Piermont Marsh, and approximately 1.5 miles from the Croton River.

Marsh straw sedge

Marsh straw sedge is listed as threatened by New York State. This plant usually occurs in and adjacent to salt and brackish coastal tidal marshes. Rarely, it is found within slightly inland tidal marshes. Specifically, it occurs on dune swale and on dry or wet sands. It can also be found in fens, margins of wetlands and wet forests adjacent to the coast. The species occurs adjacent to the ocean mostly throughout Long Island and parts of New York City. There are two additional populations just north of New York City along the Hudson River (NYNHP 2022l).

According to NYNHP data, marsh straw sedge is potentially present at Con Hook tidal marsh and mudflats, which is approximately 500 ft (152 m) east of the submarine corridor.

Davis' sedge

Davis' sedge is a state-listed threatened species. This species occurs in mesic limestone, rich bottomland, and floodplain forests as well as wet meadows and open gravel bars of large rivers. Plants can occur or sometimes be restricted to disturbed areas. In New York, the species occurs adjacent or relatively near the Hudson River from just north of Albany south to Queens (NYNHP 2022m).

According to NYNHP data, Davis' sedge is potentially present at Denning Point. At its closest point, the submarine corridor is located about 2/3-mile west of Denning Point.

Smooth beggar ticks

Smooth beggar ticks is a state-listed threatened species. This species is found primarily in freshwater and brackish tidal mud flats and tidal marshes. In New York, the species occurs on Long Island and along the Hudson River (NYNHP 2022n).

According to NYNHP data, smooth beggar ticks is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Clustered sedge

Clustered sedge is a state-listed threatened species. This plant is found in open rocky habitats, particularly in damp areas of acidic bedrock or shallow soil. The species is also found in various successional habitats. In New York, the plant is primarily found in the Champlain Valley and Hudson Valley. The majority of the plants in New York are found in the Shawangunk Mountains (NYNHP 2022o).

According to NYNHP data, clustered sedge is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Great Plains flat sedge

Great Plains flat sedge is a state-listed threatened species. This plant has been found in sandy soils at beaches, railroads, roadsides, and pastures. In New York, the plant is mainly found on Long Island with a few collections from the Hudson Valley as far north as Albany County (NYNHP 2022p).

According to NYNHP data, Great Plains flat sedge is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Violet wood sorrel

Violet wood sorrel is a state-listed threatened species. This plant is found primarily on steep rocky slopes and open summit, generally on rocky, often rich soils. The current locations for the species are the Hudson Valley from Columbia County south. It is also found on Long Island (NYNHP 2022q).

According to NYNHP, violet wood sorrel is potentially present at Constitution Marsh. At its closest point, the submarine corridor is located about 800 ft (244 m) southwest of Constitution Marsh.

Water pigmyweed

Water pigmyweed is a state-listed threatened species. This plant occurs in tidal mud flats, marshes and rocky shores usually in the intertidal zone. In New York the species is found on Long Island and the Lower Hudson Valley (NYNHP 2022r).

According to NYNHP data, water pigmyweed is potentially present at Iona Island Marsh and along the Croton River. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh and 1.5 miles southwest of the Croton River.

Yellow flat sedge

Yellow flat sedge is a state-listed endangered species. This plant occurs at wet sandy sites including salt marshes, coastal plain pond shores, and wet, sandy, weedy roadsides. Yellow flat sedge occurs in southeastern New York, from as far north as Orange County through parts of the New York City area and Long Island (NYNHP 2022s).

According to NYNHP data, yellow flat sedge is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Water starwort

Water starwort is a state-listed threatened species. This plant requires bare, muddy ground and has been found at mud flats, pastures, pond shores, driveways, and both upland and wetland forests. In New York, the species is found in the Hudson Valley from Rockland County north to Columbia County. One site is also present on Long Island (NYNHP 2022t).

According to NYNHP data, water starwort is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Annual saltmarsh aster

Annual saltmarsh aster is a state-listed threatened species. This plant occurs in coastal areas in salt to brackish marshes. Along the banks of salt influenced tidal channels and creeks, shrub dominated salt influenced habitats, edges of salt ponds, wet brackish swales in maritime dunes, and in disturbed habitats that are salt influenced. In New York, the species is found on the shores of Long Island west to Brooklyn and Staten Island and north along the edges of the Hudson River to Putnam and Rockland Counties (NYNHP 2022u).

According to NYNHP data, annual saltmarsh aster is potentially present at Iona Island Marsh. At its closest point, the submarine corridor is located about 1/3-mile northeast of Iona Island Marsh.

Single-glumed spike rush

Single-glumed spike rush is a state-listed threatened species. This plant occurs in or near salty or brackish water usually at the margin of fluctuating shorelines. In New York, single-glumed spike rush is known from Long Island, New York City, and the Lower Hudson River north to Orange County (NYNHP 2022v).

According to NYNHP data, single-glumed spike rush is potentially present along the Hudson River shore at the base of Dundenberg Mountain. At its closest point, the submarine corridor is located about 800 ft (244 m) east of the base of Dundenberg Mountain.

Northern shore quillwort

Northern shore quillwort is a state-listed endangered species. This plant is mostly found in submerged aquatic settings but can also be found in shoreline areas where the roots may be in wet soil and the leaves are fully exposed to air. Its habitat includes pond margins, cobble shorelines of large rivers, tidal mudflats, and shallow gravelly areas of lakes (NYNHP 2022w).

According to NYNHP data, northern shore quillwort is potentially present along the Croton River. At its closest point, the submarine corridor is located about 1.5 miles southwest of the Croton River mouth.

4.10.2.2 Marine Species Existing Conditions

Two federally and state-listed endangered fish species (NOAA GARFO 2019, NYSDEC 2015) occur within the proposed submarine transmission line corridor:

- Atlantic sturgeon (*Acipenser oxyrinchus* [New York Bight Distinct Population Segment (DPS)]) (77 FR 5880 and 77 FR 5914, Recovery Plan: N/A); and
- Shortnose sturgeon (*Acipenser brevirostrum*) (32 FR 4001, Recovery Plan: NOAA Fisheries 1998).

Four species of federally and state-listed T&E sea turtle species (NOAA GARFO 2019, NYSDEC 2015) may seasonally occur within portions of the proposed submarine transmission line corridor:

- Endangered Kemp's ridley turtle (*Lepidochelys kempii*) (35 FR 18319, Recovery Plan: NOAA Fisheries et al. 2011);
- Endangered leatherback turtle (*Dermochelys coriacea*) (35 FR 849, Recovery Plan: NOAA Fisheries & USFWS 1992);
- Threatened loggerhead turtle (*Caretta* [Northwest Atlantic DPS]) (76 FR 58868, Recovery Plan: NOAA Fisheries & USFWS 2008); and
- Threatened green turtle (*Chelonia mydas* [Northwest Atlantic DPS]) (81 FR 20057, Recovery Plan: NOAA Fisheries & USFWS 1991).

Atlantic Sturgeon

The Atlantic sturgeon (New York Bight DPS) is listed as endangered both federally and in New York State by reference to the federal listings (NYSDEC n.d.[d]; NOAA GARFO 2019). Atlantic Sturgeon are born in freshwater, then migrate to the sea. Once mature, they may return to their natal freshwater rivers to spawn (Bain et al. 1998). The majority of the action area is within the Hudson River which is Critical Habitat for the Atlantic sturgeon (NOAA GARFO 2019).

Atlantic sturgeon are present in the action area in the adult life stage foraging and migrating between upstream spawning sites and the Atlantic Ocean as well as the subadult life stage foraging from the mouth of the Hudson River north to the Troy Dam (NOAA GARFO 2019). Both life stages are expected to be present in the Hudson during similar time frames from April through November (NOAA GARFO 2019). Spawning in the Hudson River occurs in freshwater reaches within in-channel or off-channel habitats from late April through late July (NOAA Fisheries 2020). Known spawning areas occur north of the survey area near Hyde Park, NY (RM 80) and Catskill, NY (between RM 110 and 115; NOAA Fisheries 2020). Spawning has not been documented south of RM 70, which is near Crown Heights, Poughkeepsie, NY (Van Eenennaam et al. 1996; Bain et al. 1998; NOAA GARFO 2019). Evidence suggests that females do not feed during spawning runs in freshwater (Bain et al. 1998). Male and female Atlantic sturgeon have been observed to enter the river at different times and the sexes exhibit differing lengths of stay throughout the spawning season (Breece et al. 2021). Male sturgeon enter the Hudson starting in April and remain as late as November (NOAA GARFO 2019). During their upstream migration, males typically stay in water greater than 7.6 m (25 ft) deep. In contrast, female adult Atlantic sturgeon enter the Hudson River for spawning beginning in mid-May and return to open marine habitats quickly after spawning (NOAA GARFO 2019). Breece et al. (2021) found that mean arrival day for adult Atlantic sturgeon in the Hudson River at RM 31 for females was June 3 and May 23 for males. Within the same sex, arrival dates had less variability than departure dates. Mean departure dates were calculated to be July 10 for females and July 12 for males. Adult Atlantic sturgeon were also detected migrating through the East River (Tomichek et al. 2014).

After their first year, juvenile Atlantic sturgeon become gradually more tolerant to saline waters and are present within portions of the survey area year-round as they migrate and forage (NOAA GARFO 2019). Tracking data from tagged juvenile Atlantic sturgeon indicate that during the spring and summer, individuals are most likely to occur within RM 37 to 106; Morris 2022). During summer occupation, juvenile Atlantic sturgeon are known to inhabit deep-water habitats including the navigation channel. During winter months, most juveniles concentrate in brackish water from RM 12 to 46. This seasonal change in distribution may be associated with seasonal movements of the saltwedge and differential seasonal use of habitats (Morris 2022). Juveniles tend to disperse upstream beginning in late spring (Bain

et al. 1998). Subadults also migrate and forage year-round in the East River (NOAA Fisheries 2020). A majority of the subadults (142 of 148) genetically sampled in the tidal Hudson River estuary were found to have originated from the Hudson River (Wirgin et al. 2018). The remaining individuals originated from the Kennebec River (two individuals; Gulf of Maine DPS), Delaware River (two individuals; New York Bight DPS), Ogeechee River (one individual South Atlantic DPS), and James River (two individual; Chesapeake Bay DPS). Haverstraw Bay and Newburgh Bay are documented areas of juvenile Atlantic sturgeon habitat (Sweka et al. 2007).

Shortnose Sturgeon

One other federally and state-listed endangered fish species that has the potential to occur in the survey area is the shortnose sturgeon. Adult and juvenile shortnose sturgeon migrate and forage in portions of the action area (NOAA GARFO 2019). Juvenile shortnose sturgeon may also overwinter in portions of the action area. In general, the use of marine waters by shortnose sturgeon is limited to the estuaries of their natal rivers. In the Hudson River, from late spring through early fall, adult sturgeon occur in deep channel freshwater and brackish habitats. Shortnose sturgeon have been recorded in a large portion of the Hudson River estuary, in a 1998 study most were documented between approximately RM 24 and 76 (Bain et al. 1998). When passive acoustic telemetry was used, shortnose sturgeon were detected north of RM 140 in Troy during the spring and stretched south to RM 15 in the summer (Pendleton et al. 2018). Shortnose sturgeon have not been recorded in the Harlem River or portions of the action area within the East River (Tomichek et al. 2014).

In winter, adults mainly concentrate in one area near Kingston, NY (approximately RM 90), north of the action area. Two additional smaller overwintering areas for adult shortnose sturgeon are also located from Saugerties to Hyde Park at approximately RM 76 to 105 and in the Croton-Haverstraw Bay area at RM 33 to 38 (Pendleton et al. 2018). Only the smaller overwintering aggregation in the Croton-Haverstraw Bay area overlaps with the action area where the survey vessels may transit, but no sampling would occur in the Croton-Haverstraw Bay area. Many juveniles overwinter in the lower river from the Battery to just north of Haverstraw Bay (RM 0 to 64; NOAA GARFO 2019). Shortnose sturgeon spawning has been documented to occur from late March to early May in the Hudson River north of Coxsackie, NY (approximately RM 125), which is well north of the action area (NOAA GARFO 2019). After spawning, the adults disperse downriver into their summer range (Bain et al. 1998; Pendleton et al. 2018). Gravel has been shown to be the strongest habitat predictor for shortnose sturgeon occurrence during the spring, with a weaker relative importance for mud substrate during the summer (Pendleton et al. 2018).

4.10.2.3 Marine Mammals and Sea Turtles

Sea turtles may be seasonally present in southern portions of the action area from May to mid-November with the highest concentrations present from June to October (NOAA GARFO 2019). This includes both portions of the survey area (e.g., Harlem and East Rivers) and nearby waters that survey vessels may transit to reach the survey area (e.g., Upper New York Bay). Juvenile and adult sea turtles generally migrate north into the Mid-Atlantic region in the spring as coastal water temperatures increase and migrate south in the fall as water temperatures cool. The occurrence of these migratory species within portions of the action area would be transient as nesting generally occurs in lower latitudes (NOAA Fisheries n.d.[a][b][c][d]). The action area has not been designated as Critical Habitat for any sea turtles, and there are no identified habitats of particular concern within the action area (NOAA GARFO 2019). Leatherback turtles are generally found in deeper offshore waters (USFWS 2018) and are therefore not likely to be located within the action area. The remaining sea turtle species referenced above might seasonally visit southern portions of the action area while foraging or migrating (NOAA GARFO 2019). However, it is unlikely that any sea turtles would be encountered during the proposed survey activities.

The NOAA Section 7 Mapper for the Greater Atlantic Region (NOAA GARFO 2019) as well as the NYSDEC ERM (NYSDEC n.d.[c]) for the action area do not identify any endangered or threatened marine mammals being present in the action area.

4.10.3 Important Habitats in the Project Area: Existing Conditions

4.10.3.1 Sturgeon Critical Habitat

Within the Hudson River, the proposed submarine transmission line corridor consists of a northern and a southern segment. The northern segment is roughly between RM 62 and RM 42, and the southern portion is roughly between RM 34 and RM 14. The surface sediment within the submarine corridor is a mixture of sand, mud (i.e., silt and clay), with pockets of gravel (Nitsche et al. 2006) (Figure 4-8 in see Attachment 1 to this Exhibit). See further discussion of marine physical characteristics in Section 4.8, above.

Five DPSs of Atlantic sturgeon were listed under the ESA in 2012 (77 FR 5880, 77 FR 5914) including the endangered New York Bight DPS. The final rule for Atlantic sturgeon critical habitat (all listed DPSs) was issued on August 17, 2017 (82 FR 39160). Critical habitat designations for the New York Bight DPS includes the Hudson River, within New York Bight Unit 3. Unit 3 of the Atlantic sturgeon New York Bight critical habitat begins where the main stem of the Hudson River discharges into the New York City Harbor at river mile (RM) 0 and stretches up to the Troy Lock and Dam at RM 154. New York Bight Unit 3 is broken into 3 parts: A, B, and C. The proposed submarine corridor extends into Part A of the New York Bight Unit 3 in the lower Hudson River.

Physical and biological features (PBFs) within these designated critical habitats have been identified as vital to conservation of the New York Bight DPS of Atlantic sturgeon, but may be ephemeral or vary spatially across time. These features include:

- PBF 1- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, and boulder) in low salinity waters (i.e., 0.0 to 0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- PBF 2- Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;
- PBF 3- Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, and gear) between the river mouth and spawning sites necessary to support:
    - Unimpeded movements of adults to and from spawning sites;
    - Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and
    - Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (e.g., at least 3.9 ft [1.2 m]) to ensure continuous flow in the main channel at all times when any sturgeon in any life stage would be in the river; and
- PBF 4- Water between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support:
    - Spawning;
    - Annual and interannual adult, subadult, larval, and juvenile survival; and

- Larval, juvenile, and subadult growth, development, and recruitment (e.g., 55°F [13°C] to 78.8°F [26°C] for spawning habitat and no more than 86°F [30°C] for juvenile rearing habitat, and 6 mg/L or greater dissolved oxygen for juvenile rearing habitat). 82 FR 39160.

The location of the freshwater/saltwater interface (salt front) is vital to understanding potential impacts on critical habitat for Atlantic sturgeon since fertilized eggs require low salinity waters in order to settle and grow (PBF 1) and juvenile foraging and growth (PBF 2). As discussed in Section 4.8.2.4, the salt front in the Hudson River ranges from approximately New Hamburg (RM 67.7) to Hastings-on-Hudson at RM 21.5 (de Vries and Weiss 2001). However, the salt front may extend as far south as the Bronx (near RM 15) during periods of heavy freshwater discharge and as far north as Poughkeepsie (RM 75) during periods of very low freshwater flow. Freshwater inputs tend to be highest during the spring and lowest during the summer months. The salinity of the river increases as distance from the salt front down river increases (PBF 2). Hard bottom substrate, essential for fertilized egg settlement (PBF 1) is limited in the Project Area. Six patches of gravel, less than 800 ft (244 m) wide and 3.1 mi (5.1 km) in length are mapped within the Project Area (NYSDEC 2005). South of the Federal Lock and Dam at Troy, the Hudson River is absent physical barriers to passage and generally has water column properties that support spawning, survival of all life stages, and growth of all life stages other than adults (PBFs 3 and 4).

4.10.3.2 Significant Coastal Fish and Wildlife Habitat: Existing Conditions

The proposed transmission line corridor crosses several Significant Coastal Fish and Wildlife Habitats (SCFWH) within and along the Hudson River as summarized in the following section (Figure 4-12 in Attachment 1 to this Exhibit). Under the authority of the Coastal Management Program and the Waterfront Revitalization and Coastal Resources Act, NYSDEC evaluates the statewide importance of coastal fish and wildlife resources, which upon review of the evaluation, becomes mapped and designated as SCFWH by the New York State Department of State (Executive Law of New York, Article 42).

Crossed by the Proposed Corridor

Hudson Highlands

The Hudson Highlands was designated as SCFWH in 1987. The Hudson Highlands is an extensive area of deep, turbulent river channel with strong currents and rocky substrates; unusual for the Hudson River estuary. This SCFWH is the Hudson's deepest and narrowest segment with strong currents and rocky substrates. Water salinity throughout is variable as the salt front migrates up and down the river through this area depending on tidal conditions and the amount of freshwater inflows up-river, which are dependent on seasonal weather patterns and extreme events. The combination of swift currents, rocky substrates, and freshwater inflow over this large area provides highly favorable conditions for reproduction by coastal migratory fishes, especially striped bass. Striped bass are known to spawn above river's salt front between West Point and Kingston from April to mid-June, with the semi-buoyant eggs found in greatest concentration from mid-May to early June and larvae transforming to juvenile between late June and early July. A portion of the SCFWH near Iona Island has been designated as part of a Hudson River National Estuarine Research Reserve (HNERR) site (Figure 4-12 in Attachment 1 to this Exhibit).

Haverstraw Bay

Haverstraw Bay was designated as SCFWH in 1987. The area is the most extensive area of shallow (less than 15 ft) estuarine habitat in the lower Hudson River which deepens to a navigation channel (dredged to about 35 ft). The area produces a predominantly brackish water habitat where the freshwater mixes with salt water from the Atlantic. The area is a major spawning, nursery, and wintering area for various estuarine fish species, most notable anchovy, Atlantic menhaden, and blue claw crab. Shortnose sturgeon regularly

occur in the area. The area also contributes to recreational and commercial fisheries. Significant numbers of waterfowl may occur in Haverstraw Bay during spring (March-April) and fall (September- November) migrations, but the extent of their use in this area is not well documented.

Lower Hudson Reach

The Lower Hudson Reach was designated as SCFWH in 1992. The Lower Hudson Reach is one of only a few large tidal river mouth systems in the northeastern United States' therefore it provides a unique range of salinity and other estuarine features. Salinity in this brackish environment ranges from 3.8 ppt to 18.7 ppt depending on the location of the salt front, which varies with the seasons. Concentrations of wintering striped bass and winter flounder are found in the area.

Within 1-mile Radius of the Proposed Corridor

Fishkill Creek

The Fishkill Creek was designated as SCFWH in 1987. The Fishkill Creek is a major freshwater tributary of the lower Hudson River containing a diversity of estuarine habitats. The habitat also includes a relatively large, wooded peninsula that extends into the Hudson River. Most of the Fishkill Creek habitat is within the tidal range of the Hudson River and contains extensive areas of mudflats, emergent marsh, and SAV beds. The diversity of natural ecological communities in the Fishkill Creek habitat provides favorable conditions for a variety of fish and wildlife species. Fishkill Creek is an important spawning area for coastal migratory fishes such as alewife, American eel, blueback herring, white perch, Atlantic tomcod, and striped bass.

Moodna Creek

The Moodna Creek was designated as SCFWH in 1987. The Moodna Creek is a major freshwater tributary of the lower Hudson River that is accessible to coastal migratory fishes; including the largest tidal marsh in Orange County. Moodna Creek is a relatively large, medium gradient, perennial, warmwater stream with a rocky substrate and a relatively undeveloped forested floodplain. The lower mile of the creek is within the tidal range of the Hudson River and is relatively deep with a silt and clay substrate. The marsh at the mouth of Moodna Creek is significant for rare plants and rare natural Communities including brackish intertidal mudflats and brackish tidal marsh. The considerable length of Moodna Creek that is accessible to coastal migratory fishes and the extensive wetland area at the mouth of the creek provide favorable habitat conditions for a variety of fish and wildlife species. Moodna Creel is an important spawning area for migratory fishes such as alewife, blueback herring, bay anchovy, American eel, Atlantic tomcod, and striped bass.

Constitution Marsh

The Constitution Marsh was designated as SCFWH in 1987. The Constitution Marsh is one of the largest undeveloped tidal wetlands on the Hudson River. The predominant ecological communities in the area include tidal marshes and flats, ranging in salinity from freshwater to brackish. Constitution Marsh receives freshwater inflows from several small, high gradient, coldwater streams, including Foundry Brook, Indian Brook, and Philipse Brook. The lack of development within the Marsh provides favorable habitat for vegetation and fish and wildlife species. The extensive shallow water areas and stream mouths provide spawning and nursery habitat for a variety of coastal migratory and resident freshwater fishes. Species found in the area include alewife, blueback herring, white perch, American eel, banded killifish, mummichog, fourspined stickleback, and largemouth bass.

Iona Island Marsh

The Iona Island Marsh was designated as SCFWH in 1987The Iona Island Marsh is a large, undeveloped tidal freshwater-brackish marsh in the Hudson River. Iona Island Marsh includes a sizeable tidal freshwater marsh within the Hudson estuary. The site has been designated one of four component sites of the HNERR (Figure 4-12 in Attachment 1 to this Exhibit) and is registered as a National Natural Landmark with the U.S. Department of Interior. The habitat is a highly productive wetland, with minimal human disturbance, providing favorable habitats for a variety of fish and wildlife species. Shallow bay areas and creek channels in Iona Island Marsh provide spawning and nursery habitats for a variety of coastal migratory species and resident freshwater fishes. Species found in the area include American eel, alewife, blueback herring, white perch, striped bass, banded killifish, and mummichog.

Croton River and Bay

The Croton River and Bay was designated as SCFWH in 1987. The Croton River and Bay is a major tributary and sheltered bay of the lower Hudson River, and the largest SAV in Haverstraw Bay occurs at the mouth of the Croton River. Freshwater tidal wetlands are also found along the bay. The Croton River and Bay have been subject to considerable habitat disturbance, including filling of wetlands for development, waste disposal, discharges of stormwater runoff, and the presence of road and railroad crossings, and invasive species. Despite significant habitat alterations affecting the area, tidal portions of Croton River and Bay remain important as fish and wildlife habitats in the lower Hudson Valley. Croton River and Bay comprise a large shallow bay area in the lower river that is sheltered from strong river currents and, to some extent, from prevailing winds. Consequently, the area provides favorable habitat conditions for a variety of coastal migratory and resident warmwater fish species.

Manitou Marsh

The Manitou Marsh was designated as SCFWH in 2012. The Manitou Marsh is an approximately 75-acre enclosed freshwater to low salinity tidal marsh located on the eastern shore of the Hudson River. Manitou Marsh is part of Manitou Point Preserve, which is owned by Scenic Hudson and managed by the Scenic Hudson Land Trust. Disturbances to this habitat include activities related to small residential communities, activities along the railroad causeway, and expansion of invasive species. Manitou Marsh provides important nursery habitat for resident freshwater, migratory and estuarine/marine species. Resident freshwater fish include carp, black-nose dace, yellow perch, redbreast sunfish, golden shiner, inland silverside, pumpkinseed, brown bullhead, bluegill, Eastern silvery minnow, and largemouth bass. Migratory fish species include alewife, striped bass, American eel, and blueback herring.

Piermont Marsh

The Piermont Marsh was designated as SCFWH in 1987. The Piermont Marsh is the only large, undeveloped, predominantly brackish marsh on the Hudson River. A portion of Piermont Marsh SCFWH is one of four component sites of the HNERR dedicated to environmental research and education. Sparkill Creek and Crumkill Creek within the Piermont Marsh provide limited spawning and nursery habitats for a variety of coastal migratory and resident freshwater fishes. Species found in the area include American eel, alewife, blueback herring, white perch, striped bass, banded killifish, and mummichog.

North and South Brother Islands

The North and South Brother Islands were designated as SCFWH in 1992. The North and South Brother Islands are relatively undisturbed wooded islands in the Manhattan Hills ecological region, located within the East River approximately 1 to 2 miles northeast of Randall's Island and Lawrence Point. South Brother

Island is approximately 10 acres in size, uninhabited, rocky and wooded. The North Brother Island is 15 acres in size, with a mix of abandoned buildings and deciduous woods. The North and South Brother Islands provide an undisturbed upland environment for wildlife that is rare in coastal portions of the New York City metropolitan area. The primary significance of this habitat is its use for nesting by relatively large numbers of colonial waterbirds. This nesting area probably accounts for many of the egrets and night herons seen in lower Bronx, Queens, and New York Counties. Common bird species found on these Islands include cattle egrets, snowy egrets, black-crowned night herons, great egrets, double-crested cormorants, herring gulls, and great blacked gulls.

4.10.3.3 Important Bird Areas

Important Bird Areas (IBAs) are designated as part of an international effort to identify, monitor, and protect habitats critical to the survival of bird populations. These areas are identified using internationally agreed-to criteria related to bird species that are globally threatened, occupy severely restricted ranges, are restricted to certain biomes, or species that congregate in certain habitats during part of their annual life cycle. In the United States, IBAs are approved and designated by the National Audubon Society in conjunction with guidance from BirdLife International. More than 130 IBAs have been designated in New York State (Audubon New York n.d.[a]). Figure 4-13 (see Attachment 1 to this Exhibit) shows IBAs within 1 mile of the proposed corridor.

Crossed by the Proposed Corridor

In 1997, Audubon New York identified the Catskill Peaks IBA in the Catskill Peaks region because it supports a significant proportion of the State's Bicknell's thrush population, in addition to providing habitat for other members of the sub-alpine bird community. The terrestrial transmission line corridor crosses this IBA for 11 miles in Delaware County from milepost 19.3 to 29.9. Most of the IBA is managed by New York State, but some parcels are privately owned. Areas of this IBA over 3,000 ft (914 m) support a sub-alpine bird community, including breeding yellow-bellied flycatcher, Swainson's thrush, hermit thrush, magnolia warbler, yellow-rumped warbler, white-throated sparrow, and dark-eyed junco. Areas above 3,500 ft (1,067 m) support the southern-most known breeding sites for Bicknell's thrush and blackpoll warbler. Other at-risk species found at the site include American black duck (breeds), osprey (breeds), bald eagle (observed in breeding season), sharp-shinned hawk (breeds), Cooper's hawk (breeds), northern goshawk (breeds), red-shouldered hawk (breeds), peregrine falcon (breeds), American woodcock (breeds), olive-sided flycatcher (breeds), wood thrush (breeds), cerulean warbler (breeds), and Canada warbler (breeds).

The Lower Hudson River IBA extends from just north of the Newburgh-Beacon Bridge south to Croton Point Park. The transmission line corridor crosses this IBA for approximately 24.3 miles, 22.0 miles of which are within the Hudson River and 2.2 miles of which are on Croton Point in Westchester County. The area is one of the most important wintering areas for bald eagles in the State and is also used as a nesting area for several pairs of bald eagles. Protection of important winter roost sites is a key conservation issue for the IBA (Audubon n.d. [b]). Other birds of concern known to use the area specifically around Croton Point include northern harrier (year-round), short-eared owl (wintering), grasshopper sparrow (breeding), vesper sparrow (migration stopover site), and Henslow's sparrow (stopover habitat).

Within 1-mile Radius of the Proposed Corridor

The Fahnestock and Hudson Highlands State Park IBA (New York Audubon n.d.[b]) was established in 2008, and includes the Hudson Highlands State Park adjacent to the Hudson River in Putnam County. The submarine corridor is within 1 mile of this IBA for approximately 4 miles and is 1,120 ft (341 m) away from the IBA at its closest point. The deciduous and mixed forests of the area support a broad bird

community including several species of concern: sharp-shinned hawk and Cooper's hawks (both confirmed breeders), northern goshawks (foragers, probable breeders), and whip-poor-will (breeding). Granite cliffs in the area provide nesting sites for peregrine falcon.

The Constitution Marsh IBA is part of the Hudson Highlands State Park and managed by Audubon New York as a wildlife conservation area; it was designated as an IBA in the early 2000s. An Audubon Center is on-site, providing education programs to the public. Constitution Marsh consists of a 4,000 to 5,000 year old fresh and brackish (depending on the time of year) tidal marsh (270 acres) and forested uplands (80 acres) located on the east shore of the Hudson River, directly opposite West Point Military Academy, and 52 miles north of New York City. The submarine transmission line corridor is within 1 mile of this IBA for approximately two miles and is 320 ft (98 m) from the IBA at it closest point. More than 200 species of birds have been recorded there, including nesting least bitterns, Virginia rails, and marsh wrens. Large numbers of waterfowl use the area during winter and migration, with average fall concentrations of up to 2,000 individuals reported. Mixed flocks of blackbirds (bobolinks, red-winged blackbirds, and common grackles) numbering in the thousands, use the site as a staging area and migratory stopover in the fall. Other at-risk species using the site include pied-billed grebes, American Bitterns, ospreys, bald eagles, northern harriers, sharp-shinned hawks, Cooper's hawks, merlins, peregrine falcons, willow flycatchers, wood thrushes, blue-winged warblers, cerulean warblers, worm-eating warblers, and Canada warblers.

Doodletown and Iona Island were designated as an IBA in 1997. It is situated along the western shore of the Hudson River just south of West Point, and includes portions of Bear Mountain State Park. The submarine transmission line corridor is within 1 mile of this IBA for approximately two miles and is 875 ft (267 m) from the IBA at it closest point. Deciduous forest, riverine habitats, and freshwater/brackish tidal wetlands dominate the site and influence bird use. More than 165 bird species have been documented at the site, including an unusual abundance and diversity of breeding warblers and other songbirds. At-risk species supported at this site include the pied-billed grebe, osprey, bald eagle, northern harrier, and golden-winged warbler. Other species documented here include the Acadian flycatcher, Louisiana waterthrush, Kentucky warbler, and hooded warbler.

Designated as an IBA in 1997, Hook Mountain includes almost seven continuous miles of riverfront and cliff slopes in Upper Nyack. The submarine transmission line corridor is within 1 mile of this IBA for approximately 5 miles and is 3,955 ft (1,205 m) from the IBA at it closest point. This IBA is the site of a fall hawk watch that has operated annually at the precipice of a ridge since 1971. An average of more than 12,000 hawks (maximum 25,929) are counted here each fall. This includes averages of 269 ospreys (maximum 435), 11 bald eagles (maximum 48), 183 northern harriers (maximum 362), 3,380 sharp-shinned hawks (maximum 7,070), 85 Cooper's hawks (maximum 166), 20 northern goshawks (maximum 112), 97 red-shouldered hawks (maximum 184), 3 golden eagles (maximum seven), and 13 peregrine falcons (maximum 54). Other hawk species include averages of 7,603 broad-winged hawks (maximum 18,733), 232 red-tailed hawks (maximum 462), 540 American kestrels (maximum 930), and 29 merlins (maximum 59).

North Brother and South Brother Islands, two small islands in the East River, were declared an IBA in the early 2000s. The submarine transmission line corridor is within 1 mile of this IBA for approximately 0.3 miles and is 3,200 ft (975 m) away from the IBA at it closest point. The site is important for nesting wading birds. Species nesting on the islands include great egrets (estimated 60 nests), snowy egrets (estimated 65 nests), cattle egrets (two nests), black-crowned night-herons (365 nests), and glossy ibis (four nests). Other nesting birds are double-crested cormorant (350 nests), herring gulls (140 nests), and great black-backed gull (90 nests). In addition, these islands are used for roosting and foraging sites for various waterbird species year-round.

4.10.3.4 Natural Communities Existing Conditions

Natural communities include locations of rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. NYNHP designates natural communities as significant when the community type is rare in New York State or, for more common community types, where the community at that location is a high-quality example and meets specific, documented criteria for state significance in terms of size, undisturbed and intact condition, and the quality of the surrounding landscape (NYSDEC 2022x). Natural communities identified by NYNHP near the proposed transmission line corridor (NYNHP 2021) are discussed in the following section.

Perched Bog

A perched bog is a flat peatland that occurs in shallow depressions in rock outcrops where there is a perched water table (Edinger 2014). This habitat is a good quality mature bog with no invasive species as it is well buffered from development. Typically, this occurs within a rocky barrens community. Vegetation is dominated by peat mosses and ericaceous shrubs, and the substrate is a shallow peat overlying bedrock.

A perched bog was identified by NYNHP within the Wolf Brook State Multiple Use Area approximately 0.3 miles southwest of the proposed corridor. Desktop analysis indicates that the identified perched bog is approximately 400 ft (122 m) southwest of the proposed corridor. In addition, a much smaller and open portion of the bog occurs just to the southeast of the main perched bog and is about 360 ft (110 m) southwest of the proposed corridor. A field-delineated PSS wetland is crossed by the corridor in this area and is hydrologically connected to the perched bog.

Hemlock-Hardwood Swamp

Hemlock-hardwood swamps are mixed swamps occurring on mineral soils and deep muck in depressions that receive groundwater discharge (Edinger 2014). This is a common and widespread swamp community in New York. Water levels typically fluctuate seasonally, typically being flooded in the spring and relatively dry by late summer.

A hemlock-hardwood swamp was identified by NYNHP in the Neversink River Unique Area approximately 0.5 miles west of the proposed corridor. The swamp is a smaller than average hemlock-hardwood swamp but was noted by NYNHP as being located within a good quality and large, forested landscape. Based on the Applicant's field delineation and desktop analysis, no portion of this community is present within or adjacent to the proposed transmission line corridor.

Floodplain Forest

Floodplain forests are typically hardwood forests occurring on mineral soils on low terraces of river floodplains and river deltas. This is a broadly defined community that can be variable and may be very diverse (Edinger 2014).

NYNHP identified a floodplain forest community along the Basher Kill where this stream is crossed by the proposed corridor. According to NYNHP, this forest community that occurs in patches but with a continued nuisance of Japanese knotweed. The proposed corridor is contained within the existing NYPA ROW where it crosses the Basher Kill and vegetation is managed by NYPA in this area in accordance with its IVM plan to prevent the growth of trees. Consequently, the floodplain forest community is not present within the proposed corridor.

Chestnut Oak Forest

Chestnut oak forests are hardwood forests occurring on well-drained sites within glaciated portions of the Appalachians. A chestnut oak forest was identified by NYNHP from where the proposed corridor crosses the Basher Kill and extending east-southeast for 2.9 miles to Mountain Road. NYNHP classified this as a very large chestnut oak forest in good to excellent condition. Evidence of this community was observed adjacent to the transmission line corridor during the Applicant's field delineations.

Hemlock-Northern Hardwood Forest

This community is a mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist well-drained sites at the margins of swamps. Canopy cover can be dense, resulting in low light on the forest floor and a relatively sparse ground layer (Edinger 2014).

A hemlock-northern hardwood forest was identified by NYNHP from where the proposed corridor crosses the Basher Kill and extending east-southeast for 2.9 miles to Mountain Road. NYNHP classified this as a patchy forest of varying condition. Evidence of this community was observed adjacent to the transmission line corridor during the Applicant's field delineations.

Red Maple-Hardwood Swamp

This community is a hardwood swamp occurring in poorly drained depressions or basins. They usually occur on inorganic soil but can also form on muck or shallow peat. The hydrology varies from permanently saturated to the surface to seasonally flooded/ wet with hummocks and hollows (Edinger 2014).

NYNHP identified a mature and very large red maple-hardwood swamp with very high species diversity located near Orange Lake and extending to within 0.1 miles of the proposed transmission line corridor. The proposed corridor in the vicinity of this community occurrence is located within the I-84 median and based on field delineations this community type is not present.

Brackish Intertidal Mudflats

Brackish intertidal mudflats are a sparsely vegetated community characterized by low-growing rosette-leaved aquatics. The community occurs on exposed intertidal mudflats where water salinity ranges from 0.5 to 18.0 ppt. The community is best developed where the habitat is nearly level so that large expanses are exposed at low tide (Edinger 2014).

NYNHP identified brackish intertidal mudflats at the following locations: Moodna Creek at the mouth of the Hudson River (approximately 0.8 miles from the proposed corridor), Con Hook (approximately 0.2 miles from the proposed corridor), Constitution Marsh (approximately 0.3 miles from the proposed corridor), Iona Island Marsh (approximately 0.5 miles from the proposed corridor), and Piermont Marsh (approximately 1 miles from the proposed corridor).

Brackish Tidal Marsh

Brackish tidal marshes occur where water salinity ranges from 0.5 to 18.0 ppt and water is less than 6 ft (1.8 m) deep at high tide. The community includes a diverse mixture of saltmarsh and freshwater tidal marsh species with no species attaining dominance over extensive areas (Edinger 2014).

NYNHP identified brackish tidal mudflats at the following locations: Moodna Creek at the mouth of the Hudson River (approximately 0.8 miles from the proposed corridor), Con Hook (approximately 0.2 miles

from the proposed corridor), Constitution Marsh (approximately 0.3 miles from the proposed corridor), Iona Island Marsh (approximately 0.5 miles from the proposed corridor), and Piermont Marsh (approximately 1 miles from the proposed corridor).

Cliff Community

A cliff community occurs on vertical exposures of resistant, non-calcareous bedrock (such as quartzite, sandstone, or schist) or consolidated material. These cliffs often include ledges and small areas of talus. There is minimal soil development, and vegetation is usually sparse (Edinger 2014).

NYNHP identified a cliff community approximately 240 ft (73 m) northeast of the proposed corridor at Magazine Point on Constitution Island.

Pitch Pine-Oak-Heath Rocky Summit

This is a community that occurs on warm, dry, rocky ridgetops and summits where the bedrock is non-calcareous (such as quartzite, sandstone, or schist), and the soils are relatively acidic. The vegetation may be sparse or patchy, with numerous rock outcrops. This community is broadly defined and includes examples that may lack pines and are dominated by scrub oak and/or heath shrubs apparently related to fire regime (Edinger 2014).

NYNHP identified a pitch pine-oak-heath rocky summit community on Constitution Island, approximately 240 ft (73 m) from the proposed corridor.

Brackish Subtidal Aquatic Bed

This community is an aquatic community of continuously flooded substrates with rooted aquatic vegetation. The water is brackish (salinity between 0.5 and 18.0 ppt) and the water is usually less than 6 ft (1.8 m) deep at low tide. As salinity increases downstream, this community may grade into marine eelgrass meadows (Edinger 2014).

NYNHP identified a brackish subtidal aquatic bed community at Piermont Marsh approximately 1 mile northwest of the proposed corridor on the west side of the Hudson River.

Rocky Summit Grassland

This community is a grassland community that occurs on rocky summits and exposed rocky slopes of hills. Woody plants are sparse and may be scattered near the margin of the community (Edinger 2014). NYNHP identified a rocky summit grassland community approximately 550 ft (168 m) northeast of the proposed corridor on the Hudson River shoreline below Camp Smith.

4.10.4 Protected Species and Important Habitats Impacts and Mitigation

4.10.4.1 Submarine Corridor Species: Potential Impacts and Proposed Mitigation

As mentioned in Section 4.9.5, installation of the Project would result in temporary increases in suspended sediment. This sediment disturbance will cause a temporary elevation in TSS and potentially associated contaminants. Project-specific modeling has been conducted to estimate potential Project-related TSS concentrations down current of the Project's in-water construction activities. Based on existing sediment data and preliminary assumptions regarding cable installation methods and burial depths, the Applicant estimates that TSS concentrations may exceed 50 mg/L at a distance of 500 ft from the route in some

locations, but not others. TSS remains above 50 mg/L for only a few hours in most areas. TSS concentrations remain above 50 mg/L for 10-12 hours in a few small areas in the Hudson River and less than 24 hours in the Harlem River on the east bank and less than a few hours on the west bank. Research directly targeting Atlantic sturgeon tolerance of elevated TSS levels is lacking, however the frequent occurrence of the species in highly turbid environments, such as rivers and estuaries, suggests they tolerate elevated TSS. One study advised that in order to avoid physiological and behavior effects, adult Atlantic sturgeon should not be exposed to TSS levels of 1,000 mg/l above ambient levels for longer than 14 days (Johnson 2018). Wilkens et al. (2015) exposed juvenile Atlantic sturgeon to 100, 250, and 500 mg/l TSS levels for 3 days in a lab setting. With a 96% survival rate, they concluded that the absence of any significant effects on survival or swimming performance indicates that the impacts of sediment plumes in natural settings are minimal where fish are able to move or escape. Therefore, turbidity effects from the Project are not anticipated to have physiological or behavioral impacts on adult or juvenile Atlantic or shortnose sturgeon. Many sea turtle species routinely forage in nearshore and estuarine environments and experience temporary levels of elevated turbidity. Though foraging sea turtles are not common in the Project area, it is expected that those impacted would move to another area and avoid impacts. The remaining impacts discussed in Section 4.8.4 are not anticipated to result in measurable impacts to Atlantic sturgeon, shortnose sturgeon, or sea turtles.

As discussed in Section 4.9.5, sessile and infaunal benthic organisms within the direct area of benthic disturbance will be impacted but sediment would be expected to quickly fill in depressions following mechanical backfill, if warranted, to restore natural gradients and predominant grain size. Impacts on benthic communities would be temporary. The benthic communities are expected to begin recolonizing the affected areas quickly (i.e., days to weeks) following disturbance, and are expected to recover naturally within 1 to 5 years following disturbance. Adult Atlantic sturgeon primarily use the Hudson River estuary for spawning and migration between spawning grounds and foraging grounds. However, juvenile Atlantic sturgeon use the Hudson River estuary for both migrating and foraging year-round (GARFO 2019). Juveniles use soft substrates and prey up benthic organisms such as worms, crustaceans, and molluscs (Dadswell 2006). Shortnose sturgeon forage on crustaceans, insects, and small molluscs, with adults preferring molluscs and juveniles selecting more insects and crustaceans (Carlson and Simpson 1987). As noted above, the sessile and infaunal prey within the Applicant's submarine transmission corridor are assumed to perish and not be available as prey to juvenile Atlantic and shortnose sturgeon, as well as adult shortnose sturgeon. However, the benthic infaunal and sessile communities would return within days to weeks and sturgeon are known opportunists. It is likely that juvenile sturgeon within the area of disturbance would either leave the area to locations where infaunal or sessile prey are still available, or switch to mobile prey (e.g., crustaceans) that are able to avoid mortality from disturbance. Since sea turtle density in the Project area is expected to be low and benthic disturbance impacts to prey items temporary, the impact of benthic disturbance from the Project on sea turtles is expected to be negligible.

Though cable burial is the preferred protection technique, the Project would potentially convert localized areas of soft bottom habitat to hard bottom in areas where cable and pipeline crossings, as well as areas where sufficient burial depth cannot be achieved. Cable protection could be one of or a combination of rock, rock bags, concrete mattresses, or geotextile mattress. The amount placed around each submarine cable will be based on a variety of factors, including water flow and substrate type (hydrodynamic scour modeling), and potential other uses (e.g., commercial fishing or other maritime activities). Increases in hard bottom substrate is a potential net positive to adult Atlantic sturgeon since primary use of the Hudson River estuary is spawning and Atlantic sturgeon eggs require hard substrate to attach, however spawning has not been documented south of RM 70. Similar to the discussion above, conversion of soft to hard bottom could decrease the foraging area a negligible amount for juvenile Atlantic and shortnose sturgeon, as well as adult shortnose sturgeon. However, unlike the turbidity discussion, these impacts would be permanent. As an impact minimization measure, armoring is not the preferred method of cable protection and will only be employed when the preferred option of burial is not possible. Since sea turtle density in the Project area is

expected to be low and there is a lack of documentation of sea turtles foraging in the Project area, the impact of conversion of soft to hard bottom from the Project on sea turtles is expected to be negligible.

Also mentioned in Section 4.9.8, in-water noise would be generated during construction activities, mainly from jetting, plowing, trenching or localized dredging for cable installation. Johansson and Andersson (2012) recorded underwater noise levels generated during a comparable operation involving pipelaying and a fleet of nine vessels. Mean noise levels of 130.5 dB re 1 µPa were measured at 1,500 m from the source. Reported noise levels generated during a jet trenching operation provided a source level estimate of 178 dB re 1 µPa-m measured at 1 m from the source (Nedwell et al. 2003). Reported sound levels of clamshell dredges include 176 dB re 1 µPa-m (BC MoTI 2016) and 107 to 124 dB re 1 µPa at 154 m (~500 ft) from the source with peak frequencies of 162.8 Hz (Dickerson et al. 2001; McQueen et al. 2019). Maximum levels occurred when the dredge bucket made contact with the channel bottom in mixed coarse sand or gravel (McQueen et al. 2019; Dickerson et al. 2001). The in-water noise is not expected to exceed the NOAA Fisheries noise-injury threshold for fish (183 dB re 1 µPa2-s SELcum for fish less than 2 grams and 187 dB re 1 µPa2-s SELcum for fish 2 grams or greater). Based on NOAA Fisheries guidance, behavioral effects are possible above 150 dB re 1µPa RMS; however, effects would be temporary with effects dissipating once the activity or individual has left the area. The in-water noise threshold for injury of sea turtles for non-impulsive sources is 200 dB re 1µPa RMS, while the threshold for behavioral disturbance is 175 dB re 1µPa RMS (U.S. Navy 2017). Based on the source levels presented in the literature for cable laying activities to those that will be used for the Project, behavioral disturbance thresholds could be exceeded. Observed behavioral changes in free-swimming fish include startle response, changes in schooling patterns, and shifts of distribution in the water column (Popper et al. 2014). However, hydraulic dredging did not significantly impact horizontal swimming behavior and did not pose a barrier to adult Atlantic sturgeon migrating to spawning grounds in the James River, Virginia (Balazik et al. 2020). Behavioral effects are considered possible but would be temporary with effects dissipating once the activity has ceased or individual has left the area. Also, the Applicant acknowledges NYSDEC and/or NOAA Fisheries recommended time-of-year work restrictions during the peak sturgeon migration period in the spring and summer, although as noted above other species and resource concerns may have conflicting time-of-year restrictions that will need to be resolved in the certificate conditions. The Applicant will coordinate with NYSDEC and/or NOAA Fisheries to develop a mitigation plan for potential unavoidable adverse impacts on sturgeon, as warranted; such a plan would likely include implementation of a net conservation benefit project. Regarding sea turtles, noise-related impact is not expected due to the unlikely presence of sea turtles in the Project area and their higher threshold for noise disturbance (compared to sturgeon).

Project-related vessels, including those used in construction and operation, pose a potential collision risk to protected species. Vessel strikes caused by vessel traffic are a common cause of injury and mortality among sturgeon and sea turtles (Brown and Murphy 2010; Foley et al. 2019; Ataman et al. 2021). Propeller boats and barges can pose a risk to fish that swim near the water surface and are a potential source of mortality for Atlantic sturgeon as a result of direct collisions with the hull or propeller (Brown and Murphy 2010). However, there is little research that analyzes the type of vessels likely to cause sturgeon vessel strikes. Balazik et al. (2012) used the movement of three male Atlantic sturgeon in the James River, Virginia and considered the approximate draft of three vessel categories to extrapolate the type of vessel with the greatest potential to cause vessel strike related mortality. Through this research, it was concluded that the majority of vessel-related Atlantic sturgeon mortality in river channels is thought to be caused by large transoceanic vessels (Balazik et al. 2012), which are much larger and have much deeper drafts than the vessels anticipated for use by the Project. Large vessels have been implicated because of their deep draft (up to 40 to 45 ft [12.2 to 13.7 m]) relative to smaller vessels (15 ft [<4.5 m]), which increases the probability of vessel collision with demersal fishes like Atlantic sturgeon, even in deep water (Brown and Murphy 2010). However, due to the existing amount of vessel traffic (i.e., approximately 63 larger vessel transits per week [AIS 2017]), vessel transits in the Hudson River estuary resulting from the Project are not expected to have

a significant or measurable effects on Atlantic or shortnose sturgeon. Vessel interactions are a significant source of sea turtle injury and mortality and injury, via trauma and propeller wounds. However, due to rarity of sea turtles in the Project area, effects of vessel traffic on sea turtles are not expected to have a measurable effect.

The cable for the Project would be an extruded cross-linked polyethylene (XLPE) cable, which has significantly reduced maintenance requirements compared to a traditional, fluid-filled, paper-insulated cable. The containerized jointing method described previously ensures cable joints are performed as per manufacturer guidance, to ensure reliable operation of the Project. The submarine cable will be monitored remotely, and no regular physical maintenance is anticipated to be necessary other than occasional non-invasive surveys of the cable from a vessel, similar to the pre-construction geophysical surveys. Therefore, no further impacts to sturgeon are anticipated due to Project-related maintenance.

In the event of a fault or damage to the terrestrial portion of the transmission line, most replacement work can be completed from the nearest joint bays or vaults, not requiring extensive excavation along the cable route. During rare occasions when the submarine cable may require repair, or burial depth needs to be maintained due to natural erosion events, these unanticipated impacts would be temporary and limited to the immediate area around the cable damage or erosion area. While these maintenance-related impacts on Atlantic sturgeon and shortnose sturgeon would be similar to the type of temporary impacts that would occur during the construction phase, the maintenance-related impacts would likely be shorter in duration and much smaller in area relative to the construction phase. If excavation is required for repairs during operations, impacts would be further minimized through BMPs (i.e., similar to those used for the construction phase) on vessels activities, sediment suspension, and deposition yielding only localized, temporary impacts to Atlantic and shortnose sturgeon.

The two field types emitted by transmission cables are electric and magnetic, and collectively referred to as the EMF. The natural geomagnetic field in the United States averages approximately 50 µT and a baseline environmental electrical field ranging from 0.005 to 0.05 mV/m is generated when seawater moves through the Earth's magnetic fields (Kalmijn 1971). Atlantic sturgeon appear to have relatively low sensitivity to magnetic fields. Bevelhimer et al. (2013) studied behavioral responses of lake sturgeon, a species closely related to Atlantic sturgeon, to artificial EMFs and concluded a detection threshold between 10,000 and 20,000 milligauss (mG) (1,000 to 2,000 µT). In comparison, the Applicant's Magnetic Field Simulation Report indicates that the proposed submarine transmission line will generate a maximum magnetic field strength of approximately 3,450 mG at the surface of the riverbed, and approximately 500 mG at a distance of 3.3 ft (1 m) above the riverbed (see Appendix L: Magnetic Field Simulation Report to this Exhibit).[6] Klimley et al. (2017) detected no effect on migrating adult green sturgeon, *Acipenser medirostris*, from the 200 kV HVDC Trans Bay Cable over a seven-year study. Furthermore, it was discovered that the magnetic anomalies created by bridges spanning the San Francisco Estuary were an order of magnitude larger than those created by the HVDC cable (Klimley et al. 2017). Therefore, Atlantic sturgeon are unlikely to sense or be impacted by the magnetic fields generated by the Project. Atlantic sturgeon have electroreceptors on their snout and gill covers capable of detecting electrical fields on the order of 0.5 mV/m (Normandeau 2011; Gill et al. 2012). Information on the response of Atlantic sturgeon to detectable electrical fields is sparse. When captive juvenile Atlantic sturgeon were exposed to pieces of electropositive metal pieces producing weak electrical fields, they exhibited avoidance behavior when food was present but did not exhibit behavioral changes when food was absent (Bouyoucos et al. 2014).

[6] The magnetic field model assumes 2 ft (0.6 m) of cover over the pipeline at the riverbed, e.g., using concrete mattresses at a cable or pipeline crossing. Burial depths are expected to be much greater along most of the submarine transmission line route.

Migrating Danube sturgeon (*Acipenser gueldenstaedtii*) were observed slowing down when crossing beneath overhead high voltage AC cables and speeding up once past them (Gill et al. 2012), however these conditions are significantly different from those of the Project. For example, overhead power cables are unshielded and generate relatively powerful induced electrical fields compared to shielded subsea cables. Nonetheless, Hutchison et al. (2018) reported the generation of AC fields by two submarine HVDC cables in New York – the Neptune Regional Transmission System cable and the Cross Sound Cable. The electric fields measured above these buried cables ranged between approximately 0.2 and 1.0 mV/m. Therefore, EMF from the proposed submarine transmission line during operation may be detectable by Atlantic sturgeon, but are not expected to adversely impact the species.

Cumulative impacts of the proposed submarine transmission line installation, operation, and long-term maintenance on Atlantic and shortnose sturgeon would include both spatial and temporal impacts over the life of the project. However, the cumulative effect of these impacts would be limited by the differences in both the timing and type of impacts during the construction versus the operation phases of the Project. Initial construction impacts from cable lay and trenching activities such as noise, sediment disturbance, and increased vessel traffic in 47 miles of the lower Hudson River are expected to occur over a relatively short span of approximately 6 sequential months.

As a result of construction, it is anticipated that less than 3 acres of long-term impact from habitat conversion would also occur due to construction at locations where armoring material is placed. This area of conversion would be a small fraction of the 78,322 acres of estuary along the entire 153-mile length of the Lower Hudson River (NYSDEC n.d.). The only other ongoing and regular operational impact would be the presence of induced magnetic fields when the Project is operating and would not begin until after installation is completed. Modeling of the induced magnetic field for a scenario using the least cable cover (2-ft of concrete mattresses) yielded values well below the detectable threshold of adult individuals of a representative sturgeon species. The submarine cable will be monitored remotely, and no regular physical maintenance is anticipated to be necessary other than occasional non-invasive surveys of the cable from a vessel, similar to the pre-construction geophysical surveys. During rare occasions when the submarine cable may require repair, or burial depth needs to be maintained due to natural erosion events, these unanticipated impacts would be temporary and limited to the immediate area around the cable damage or erosion area. While these maintenance-related impacts would be similar to the type of temporary impacts that would occur during the construction phase, the maintenance-related impacts would likely be shorter in duration and much smaller in area relative to the construction phase. In the unlikely event of a cable failure requiring splicing, etc., the cable will be de-energized as soon as the fault occurs and will not be re-energized until after the repair is complete, such that there would not be any EMF impacts during the repair activity. Therefore, the cumulative impacts of the Project on Atlantic and shortnose sturgeon would not be significantly greater than the impacts independently identified for each individual phase of the Project.

4.10.4.2 Submarine Corridor Important Habitats: Potential Impacts and Proposed Mitigation

Factors of the Project with potential to impact Atlantic sturgeon critical habitat include vessel activity, physical disturbance of the riverbed during installation (including UXO removal), and long-term effects of cable operation while buried. Vessels transiting from the Project area to the docks/ports will not alter the substrate of the river (PBF 1 and 2), nor will they alter the depth of the river (PBF 3). Project vessels will not create a barrier to passage of Atlantic sturgeon in the rivers (PBF 3). Lastly, Project vessels will not alter the oceanographic conditions of salinity, temperature, and dissolved oxygen of the rivers, especially in the bottom meter of the water column, except for some potentially very localized increase in vertical mixing (PBFs 1, 2, and 4). UXO removal will likely create temporary disturbances with turbidity and long-term alteration of the topography in the immediate area of detonation, but would not alter the salinity or other oceanographic, if required (PBFs 1, 2, and 4). Though turbidity would increase if UXO detonation

were required, particle suspension would be temporary and not present a barrier to Atlantic sturgeon (PBF 3). Cable installation will be accomplished by jetting, plowing, trenching, or dredging, which can result in temporary resuspension of sediment and increased turbidity. Offshore environments have shown the water quality effects of cable installation using similar methods as the Project are short-term and localized (Latham et al. 2017). Due to the increased currents in a riverine environment, effects of cable installation are expected to be the same or even less than those in the offshore environment (PBF 3). Additionally, cable installation would not affect salinity or other water quality parameters (PBFs 1, 2, and 4).

Long-term impacts of cable operation on Atlantic sturgeon critical habitat within the immediate corridor of the Project include potential conversion of soft to hard bottom, heat, and EMF. In areas where burial of the cable is not feasible, or where sufficient burial depth is not achieved, remedial cable protection will be installed to protect the cables. The locations requiring protection, the type of protection selected, and the amount placed around each submarine cable will be based on a variety of factors, including water flow and substrate type (hydrodynamic scour modeling), and potential other uses (e.g., commercial fishing or other maritime activities). Cable protection measures may also be installed at cable and pipeline crossings. Where the submarine cable route requires the crossing of such assets, specific crossing designs will be developed and detailed in the EM&CP. The addition of hard bottom actually supports PBF 1, though spawning has not been documented south of RM 70, which is near Crown Heights, Poughkeepsie, NY (River Kilometer 113; Van Eenennaam et al. 1996; Bain et al. 1998; NOAA GARFO 2019). Cable protection would not alter salinity or water quality of the surrounding area, nor would it increase turbidity (PBFs 1, 2, 3, and 4). Though conversion of soft to hard bottom from cable protection would remove some areas for potential juvenile foraging (PBF 2), the area of potential cable protection is extremely small compared to the remaining area of the lower Hudson River, which is dominated by soft bottom habitat (NYSDEC 2005). Residual heat is lost to the surrounding environment when transmitting energy via a transmission cable. Heat emission for AC cables is greater than that emitted from DC cables (Taormina et al. 2018). Burial depth and type of surrounding sediment directly impact temperature measurements immediately surrounding the cable (Emeana et al. 2016). Temperature increase in the top layer of sediment will be negligible and temperatures at the sediment-water interface will be even further reduced due to the rapid heat dissipation from water and currents (PBF 4). EMF has not been shown to alter salinity or water quality of the surrounding area, nor would EMF increase turbidity (PBFs 1, 2, 3, and 4). EMF would also not impact the sediment composition (PBF 1).

4.10.4.3 Terrestrial Corridor Species: Potential Impacts and Proposed Mitigation

Federally and State-Listed Species

Indiana Bat

Occupied habitat for Indiana bats is all suitable habitat within 10 miles of known priority 1 or 2 hibernacula, 5 miles of known priority 3 or 4 hibernacula, 5 miles of positive acoustic survey results or mist-netting captures without identified roost tree data, and 2.5 miles of known roost trees. Potential habitat for Indiana bats is all suitable habitat that lies within USFWS' predictive model that is not already known to be occupied by Indiana bats. Based on occupied habitat data provided from USFWS and NYSDEC, and preliminary Project design, the Project would result in approximately 5.4 acres of permanent forest removal and 5.2 acres of additional forest removal in areas of occupied habitat for Indiana bats. Additionally, the Project would result in approximately 22.0 acres of permanent forest removal and 32.6 acres of additional forest removal that could provide potential habitat for Indiana bats based on the identified limits of the USFWS predictive model area.

Seasonal clearing restrictions alone do not guarantee avoidance of incidental take for Indiana bats. USFWS' New York Field Office and NYSDEC have determined that, to avoid Indiana bat take, 35% tree cover must

be maintained within the 2.5-mile radius maternity colony home range. In such instances where the surrounding tree cover is under 35%, maintaining flight corridors between suitable habitat is also reviewed. As such, to avoid take of Indiana bat, the Applicant will conduct an analysis to confirm that each known maternity colony home range within 2.5 miles of the proposed transmission line corridor exceed 35% tree cover, and that additional clearing would not lower that cover below 35%. The Applicant intends to conduct clearing of forested habitat within known or potential habitat from November 1 to March 31 to the maximum extent practicable. If a need arises to clear any suitable habitat during the active season, April 1 through October 30, the Applicant will consult with USFWS and NYSDEC to determine the best path forward to protect the Indiana bat.

The Applicant is in the process of evaluating whether any additional tree clearing is required in areas identified as occupied Indiana bat habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. The Applicant will provide results of further agency consultation, including survey results, if completed, in the EM&CP.

NLEB

Occupied habitat for NLEB is all suitable habitat within 5 miles of known hibernacula, 3 miles of positive acoustic survey results or mist-netting captures without identified roost tree data, and 1.5 miles of known roost trees. Potential habitat for NLEB is all suitable habitat that lies within the USFWS's predictive model that is not already known to be occupied by NLEB. As discussed in Section 4.10.2.1, the Project contains both occupied habitat and potential habitat for NLEB. Based on occupied habitat data from USFWS and NYSDEC, and preliminary Project design, the Project would result in approximately 6.0 acres of permanent forest removal and <0.1 acres of additional forest removal within occupied habitat for NLEB. Additionally, the Project would result in approximately 21.4 acres of permanent forest removal and 37.8 acres of additional forest removal for temporary workspace that could provide potential habitat for NLEB based on the identified limits of the USFWS predictive model area. USFWS issued a 4(d) rule of the ESA for this species, which was published in the Federal Register on January 14, 2016. The 4(d) rule prohibits "incidental take" within white- nose impacted areas of the NLEB's range when a proposed action is (1) within a known hibernaculum; (2) includes tree removal within 0.25 miles of a known hibernaculum; or (3) cuts or destroys a known, occupied maternity roost tree or other trees within a 150-ft (46-m) radius from the maternity roost tree during the pup season from June 1 through July 31. Incidental take for other activities is covered under the Programmatic Biological Opinion associated with the 4(d) rule.

All known NLEB hibernacula are greater than 0.25 miles from the transmission line corridor, and all known maternity trees are greater than 150 ft (46 m) from the corridor. As such, under the current 4(d) rule, the Applicant does not propose any actions that would result in prohibited incidental take. Any incidental take associated with clearing trees within occupied habitat is covered under the Programmatic Biological Opinion associated with the 4(d) rule. The Applicant understands that the NLEB may become an endangered species as soon as November 2022 (USFWS 2022d) which would eliminate the 4(d) rule. As such, the Applicant will continue to consult with USFWS New York Field Office regarding any updated guidelines for avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Because New York State does not have the equivalent of a USFWS 4(d) rule, a permit is required for the "take" of a State-protected species under 6 NYCRR § 182.11. "Occupied" habitat for NLEB is defined by NYSDEC as those areas within 5 miles of a known hibernacula or 1.5 miles from a documented summer occurrence (NYSDEC 2022o). As stated above, approximately 6.0 acres of known and 59.2 acres of potential NLEB habitat will be permanently cleared. The Applicant intends to avoid incidental take of NLEB by only clearing occupied habitat during the species' hibernation period between November 1 and

March 31. Assuming this is practicable based on final occupied habitat areas, design and construction schedule, a New York State incidental take permit will not be required. The Applicant is in the process of evaluating whether any additional tree clearing, other than the permanent and temporary clearing presented above, is required in areas identified as occupied NLEB habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. If a need arises to clear any suitable habitat during the active season, April 1 through October 30, the Applicant will consult with USFWS and NYSDEC to determine the best path forward to protect the NLEB.

The Applicant is in the process of evaluating whether any additional tree clearing, other than the tree clearing presented above, is required in areas identified as occupied NLEB habitat. Once determined, the Applicant will consult with USFWS and NYSDEC to determine if presence/absence surveys are necessary in these areas to assess impacts, or if time-of-year clearing restrictions will be sufficient to avoid impacts. Additionally, the Applicant will consult with USFWS and NYSDEC if the NLEB status is changed from threatened to endangered, in which case it is expected that such a change would nullify the existing 4(d) rule. The Applicant will provide results of further agency consultation, including survey results, if required, in the EM&CP.

Roseate Tern, Piping Plover, and Red Knot

As noted in Section 4.10.2.1, no nesting or essential foraging habitat is present for roseate tern, piping plover, or red knot at the Randall's Island and Lawrence Point landfalls. Any transient individuals in proximity to construction activities would be expected to temporarily relocate from the area with no risk for mortality or other harm. Consequently, the Project is not anticipated to directly impact roseate tern, piping plover, or red knot.

Bog Turtle

As discussed in Section 4.10.2.1, the Applicant completed Phase I bog turtle habitat surveys and identified two wetlands in the terrestrial transmission line corridor with suitable bog turtle habitat. The Applicant then completed Phase II presence/absence surveys in accordance with USFWS protocols (see Appendix J to this Exhibit) and determined that bog turtles are not present in either wetland. Because bog turtles were not found to be present within the transmission line corridor, the Project is not expected to affect this species.

Dwarf Wedgemussel

As discussed in Section 4.10.2.1, USFWS and NYSDEC identified the Neversink River and Basher Kill as crossings of concern for potential impacts to dwarf wedgemussel. The Applicant is evaluating the feasibility of using trenchless methods to cross both streams to avoid direct impacts and plans to complete dwarf wedgemussel survey at both crossings prior to construction. Additional details regarding survey plans and/or findings and avoidance/minimization measures related to this species will be included in the EM&CP.

Seabeach Amaranth

As discussed in Section 4.10.2.1, no suitable habitat is present for this species within the transmission line corridor or at the landfall sites. Consequently, seabeach amaranth will not be impacted by the Project.

Small-whorled Pogonia

As discussed in Section 4.10.2.1, USFWS notified the Applicant that small-whorled pogonia presence/absence surveys should be completed for any portions of the Project in Orange County where upland forest with open understory will be cleared. The Applicant has not identified any such habitat at this time, but additional evaluations will be completed as Project design advances; if any such habitat is identified within construction workspace, presence/absence surveys will be completed during the flowering period of mid-May to mid-June. Additional information regarding survey findings, if necessary, will be included in the EM&CP.

Additional State-listed Species

Bald Eagle

As discussed in Section 4.10.2.1, the terrestrial transmission line crosses two bald eagle winter concentration areas: one along the Neversink River and another on Croton Point. The Applicant plans to cross the Neversink River using HDD; the transmission line will be installed on Croton Point using a combination of trenching and HDD at the landfall site. If construction in these areas is completed during the winter, any bald eagles in the vicinity of active construction may or may not react depending on distance and noise levels. The Applicant will consult with USFWS and NYSDEC to determine the need for specific avoidance and minimization measures for construction within these bald eagle winter concentration areas, or if any additional surveys are needed.

As discussed in Section 4.10.2.1, the submarine transmission line corridor crosses three bald eagle winter concentration areas: the perimeter of Constitution Island, the stretch of the Hudson River from the Bear Mountain Bridge to Indian Point, and off the tip of Croton Point. As noted above, if construction in these areas is completed during the winter, any bald eagles in the vicinity of active construction may or may not react depending on distance and noise levels. The Applicant will consult with USFWS and NYSDEC to determine the need for avoidance and minimization measures for construction within these bald eagle winter concentration areas.

As discussed in Section 4.10.2.1, the terrestrial transmission line corridor is within 1 mile of two recently active bald eagle nests. The Conservation Plan for Bald Eagles in New York State states that construction of utilities is not recommended within 0.25-miles (1,320 ft) of an eagle nest, if there is no visual buffer. If a visual buffer exists and the activity/feature is not visible from the nest, such activities should not occur within 660 ft (201 m) of the nest site. The nest location near the Newburgh-Beacon Bridge Landfall is more than 0.25-miles from the corridor. The bald eagle nest on Croton Point is about 1,350 ft from the corridor, or just outside the recommended buffer, and a forested area provides a visual buffer from the nest. As such, no impacts to either nest site are expected from construction of the Project.

As discussed in Section 4.10.2.1, the submarine transmission line corridor is within 1 mile of six recently active bald eagle nests. Five of the six nests are more than 0.25 miles from the corridor. One nest near Manitou Marsh is within 660 ft (201 m) of the corridor with no visual buffer. The Applicant will consult with USFWS and NYSDEC once the final submarine route is determined and the exact limits of construction disturbance are established to determine appropriate avoidance and minimization measures related to this nest site.

Northern Harrier and Upland Sandpiper

As discussed in Section 4.10.1.1, there are no fields in excess of 25 acres of suitable habitat for northern harrier and upland sandpiper nesting, although habitat suitable for foraging may be present for these species

in the proposed corridor. Any transient or foraging individuals in proximity to construction activities would be expected to temporarily relocate from the area with no risk for mortality or other harm. In addition, the terrestrial transmission line will not permanently impact suitable habitat as it will be restored following construction.

The Croton Point Park landfill cap adjacent to the proposed corridor and nearby tidal marshes provide suitable habitat more than 25 acres. However, the NYNHP did not identify this area as supporting breeding populations of northern harrier or upland sandpiper. The proposed corridor in this area follows an existing road and will not impact the suitable grassland habitat present on the adjacent landfill cap or the tidal marshes. Consequently, the Project is not anticipated to directly impact northern harrier or upland sandpiper in this area. The Applicant will continue to consult with NYSDEC regarding avoidance and minimization measures for these species.

Peregrine Falcon

According to NYSDEC, peregrine falcons nest on every Hudson River bridge south of Albany (NYSDEC 2022a). Because nests located on bridges are typically located within the bridge structure high above the waterline, the Applicant does not anticipate construction-related impacts to the species related to activities at water level. The Applicant will continue to consult with NYSDEC regarding any avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Golden Eagle

As discussed in Section 4.10.2.1, golden eagles may occur proximate to the submarine corridor along the Hudson River bridges as well as in Delaware and Sullivan Counties, where they are most likely to occur during migration. There may also be some wintering and transient use. Because golden eagle nesting does not occur in New York State, any migrating, wintering, and/or transient birds near active construction will likely move on to another foraging or roosting area not directly proximate to active construction.

Pied-billed Grebe and Least Bittern

As discussed in Section 4.10.2.1, pied-billed grebe and least bittern may occur adjacent to the submarine corridor along the Hudson River shoreline, particularly in tidal wetlands. As such, there is potential for both breeding and foraging individuals of these species to be present in proximity to construction activities in the Hudson River. However, any individuals that are breeding or foraging along the outer periphery of the Hudson River marshes will be accustomed to marine traffic. As such, the Applicant does not expect these individuals will be disturbed during construction of the submarine transmission line. There will be no direct impacts to habitat because the Hudson River marshes are avoided, and surveys at the landfall locations did not identify any suitable breeding habitat adjacent to landfall locations.

Timber Rattlesnake

As discussed in Section 4.10.2.1, although suitable habitat for this species is present in some sections of the corridor in Sullivan County, NYSDEC advised the Applicant that timber rattlesnake surveys are not necessary because the Applicant offered to have monitors present during construction activities occurring within NYNHP timber rattlesnake buffer areas. These timber rattlesnake buffer areas consist of two, approximately 1-mile sections of the terrestrial corridor in Sullivan County. The Applicant will continue to consult with NYSDEC regarding avoidance and minimization measures for this species, and additional details will be provided in the EM&CP.

Brook Floater

As discussed in Section 4.10.2.1, NYSDEC identified the East Branch of the Delaware River, Beaver Kill, and Neversink River as crossings of concern for potential impacts to brook floater. The Applicant is evaluating the feasibility of using trenchless methods to cross these streams to avoid direct impacts. The Applicant also plans to complete brook floater surveys at each crossing prior to construction. Additional details regarding survey plans and/or findings and avoidance/minimization measures related to this species will be included in the EM&CP.

Musk Root

As discussed in Section 4.10.2.1, the Applicant completed a survey for the musk root in the area identified by NYNHP as containing a historic population of this species. No musk root were identified in the transmission line corridor, and as such the Project will not affect this species.

Additional State-listed Plants

The remaining State-listed plants are identified as being present in the Hudson River marshes. Because construction of the submarine transmission line is more than 200 ft (61 m) from every habitat identified as potentially containing these species, no impacts to any of the additional State-listed plant species are expected.

4.10.4.4 Terrestrial Corridor Important Habitats: Potential Impacts and Proposed Mitigation

Important Bird Areas

As stated in Section 4.10.2.3, the proposed terrestrial transmission line corridor crosses the Catskill Peaks IBA for 11 miles in Delaware County. The entire corridor across this IBA is within or immediately adjacent to the NYPA Marcy South ROW. As such, temporary clearing of herbaceous and scrub/shrub vegetation will comprise most of the habitat disturbance in the IBA. Approximately 3 acres of forestland will also be permanently cleared and converted to herbaceous or scrub/shrub vegetation within this IBA. The highest elevation crossed by the proposed corridor within the IBA is 2,464 ft amsl; therefore, the Project will not impact the sub-alpine community associated with the IBA and the at-risk birds that use such area.

Potential impacts to birds associated with fragmentation are typically a concern for large, forested tracts like the Catskills Peaks IBA; however, the Project will not cause forest fragmentation within this IBA due to the co-location with the existing NYPA ROW. NYPA maintains most of the existing ROW permanently in an unforested/early successional condition, and this will not change during operation of the Project. After the transmission line is buried, restoration and revegetation measures will restore vegetative cover as quickly as possible to benefit birds and other wildlife in addition to stabilizing soil in the ROW.

As discussed in Section 4.10.2.3, the transmission line corridor crosses the Lower Hudson River IBA for 24 miles in Westchester County. As discussed in Section 4.10.4.3, the Applicant will consult with USFWS and NYSDEC to determine the need for avoidance and minimization measures for construction within bald eagle winter concentration areas, including those occurring within the Lower Hudson IBA. Any impacts to habitat within this IBA will be temporary and limited almost entirely to within road ROWs. As such, no long-term effects on any birds of concern associated with this IBA are expected. Minor, temporary impacts to waterfowl and other waterbirds may occur on the Hudson River throughout this IBA during marine construction activities.

None of the IBAs within 1 mile of the corridor will be directly affected by the Project. Any noise associated with construction activities is likely to have little if any effect on birds occupying the IBAs given the distance from construction work areas and in consideration of typical maritime activities which take place along the Hudson River in proximity to the IBAs.

Natural Communities

Perched Bog

As discussed in Section 4.10.2.4, the proposed corridor does not cross the identified perched bog community but does cross a delineated wetland which is hydrologically connected to it. The Applicant will implement a variety of BMPs during construction across this wetland, as will be documented in the EM&CP, including but not limited to temporary wetland matting, installation of sediment and erosion control measures, and installation of trench plugs as needed around and through the wetland. Implementation of these BMPs will ensure that the water quality of the perched bog to the southeast of the corridor is not impacted during construction.

Hemlock-Hardwood Swamp

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Floodplain Forest

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Chestnut Oak Forest

As discussed in Section 4.10.2.4, evidence of this community was observed adjacent to the transmission line corridor during field surveys. The exact limits of this natural community in relation to tree clearing areas in this segment of the corridor, if any, are not know currently. If the Applicant determines that any areas of the chestnut oak forest identified by NYNHP will be cleared, they will be identified in the EM&CP along with appropriate avoidance and minimization measures that will be developed in consultation with NYSDEC.

Hemlock-Northern Hardwood Forest

As discussed in Section 4.10.2.4, evidence of this community was observed adjacent to the transmission line corridor during field surveys. The exact limits of this natural community in relation to tree clearing areas in this segment of the corridor, if any, are not know currently. If the Applicant determines that any areas of the hemlock-northern hardwood community identified by NYNHP will be cleared, they will be identified in the EM&CP along with appropriate avoidance and minimization measures that will be developed in consultation with NYSDEC.

Red Maple-Hardwood Swamp

As discussed in Section 4.10.2.4, no portion of this community is present within or adjacent to the proposed corridor. Consequently, construction and operation of the Project would not impact this natural community.

Brackish Intertidal Mudflats

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 0.2 miles of any brackish intertidal mudflats identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish intertidal mudflats. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish intertidal mudflats are located.

Brackish Tidal Marsh

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 0.2 miles of any brackish tidal marsh identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish tidal marshes. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish tidal marshes are located.

Cliff Community

As discussed in Section 4.10.2.4, a cliff community is located approximately 240 ft (73 m) northeast of the proposed submarine transmission line corridor at Magazine Point on Constitution Island along the Hudson River. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the cliff community.

Pitch Pine-Oak-Heath Rocky Summit

As discussed in Section 4.10.2.4, a pitch pine-oak-heath rocky summit community is located approximately 800 ft (244 m) northeast of the proposed submarine transmission line corridor at Magazine Point on Constitution Island. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the pitch pine-oak-heath rocky summit community.

Brackish Subtidal Aquatic Bed

As discussed in Section 4.10.2.4, no portions of the submarine transmission line corridor are within 1 mile of any brackish subtidal aquatic bed identified by NYNHP. In addition, the submarine transmission line corridor is in the deeper areas of the Hudson River where it passes in proximity to the identified brackish subtidal aquatic bed. Furthermore, all landfall locations will be made using a trenchless method, starting from onshore upland areas, with the offshore receiving location at a depth outside where brackish subtidal aquatic beds are located.

Rocky Summit Grassland

As discussed in Section 4.10.2.4, a rocky summit grassland community is located approximately 550 ft (168 m) northeast of the proposed submarine transmission line corridor on the Hudson River shoreline. The proposed transmission line will be installed in the Hudson River in this area and will have no impact on the rocky summit grassland community.

4.11 Noise

This section describes the existing conditions related to noise and potential noise impacts from the construction and operation of the Project. The applicable noise regulatory framework and the ambient noise environment applicable to the Project are described. Examples of mitigation are described that could be implemented, if needed, to avoid, minimize, and/or mitigate potential impacts to noise.

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that interferes or disrupts normal human activities, such as talking and sleeping. Decibel (dB) is a logarithmic unit of any measured physical quantity and commonly used in quantifying sound and vibration. Sound pressure levels are measured on a relative logarithmic scale where 0 dB represents the threshold of human hearing at 1 kilohertz (kHz) (20 µPa). Human hearing is more sensitive to high frequency sound (e.g., 1,000 Hz) than to low frequency sound. To approximate human hearing the A-weighting scale was developed to mimic human hearing at moderate levels and can be applied to both measured and predicted noise levels. Similarly, measured or predicted noise levels can be expressed on a C-weighted scale. This scale represents human hearing at higher levels, where sensitivity to low frequency noise becomes greater. This metric is often used to assess the potential impact of low frequency noise. Equivalent Level (L_{eq}) is the most commonly used metric for predicting, regulating, and measuring noise. It can be expressed on any of the weighting scales discussed above (but typically A-weighted) and requires a stated time interval, with one-hour being common. The L_{eq} accounts for noise fluctuations from moment to moment by averaging the louder and quieter moments and giving more weight to the louder moments. Lastly, statistical descriptors, L_{10}, L_{50}, and L_{90}, are the level exceeded 10, 50, and 90% of the time, respectively, over a stated interval. The L_{90} is representative of the lower, constant noise levels in an environment. It is often used to quantify the ambient or background noise level.

4.11.1 Applicable Noise Standards

Applicable noise standards are summarized here. See Appendix K: Pre-construction Noise Impact Assessment to this Exhibit for additional details.

There are no noise-related federal laws, rules, or regulations applicable to the Project. At the State level, NYSDEC and NYSDPS have each issued guidance on the assessment of the impact of noise from proposed facilities. According to the NYSDEC Policy Assessing and Mitigating Noise Impacts, noise impacts should be assessed at either the facility property line or at the locations of use on receiving properties. The Policy indicates that new facilities should not increase ambient noise levels at a receptor by more than 3 dBA ideally and no more than 6 dBA in any case. Additionally, the Policy recommends that a noise source, in a non-industrial setting, should not raise ambient levels above a maximum of 65 dBA.

The following NYSDPS recommendations apply to the Project:

1. 35 dBA L_{eq}-1-hour maximum equivalent continuous average sound level from the Project's converter station, outside any residence within the 35 dBA noise contour from any tonal noise sources, (e.g., transformers), on the presumption that a 5 dBA prominent tone penalty applies to a basic design goal of 40 dBA.
2. 40 dBA L_{eq}-1-hour maximum equivalent continuous average sound level from the station outside any residence from any other operational sound sources associated with the station not included in (1). If the sound emissions from these sources are found to contain a prominent discrete tone at any residence whether through modeling, calculation, or pre-construction field testing, then the sound levels at the receptors will be subject to a 5 dBA penalty; thus, a reduction in the permissible sound level to 35 dBA L_{eq}-1-hour.

3. 45 dBA L_{eq}-1-hour maximum equivalent continuous average sound level from the station at property boundaries, except for delineated wetlands and utility rights of way. This should be demonstrated with modeled sound contours and discrete sound levels at worst-case locations. No penalties for prominent tones should be added in this assessment.

At the local level, there are no ordinances relating to sound or noise specifically for the Town of Delhi where the northern converter station is located. For the southern converter station, the New York City Administrative Code includes two ordinances that pertain to noise levels: (1) NYC Noise Code 24-232 Allowable Decibel Levels and (2) NYC Noise Code 24-218 General Prohibitions. The first establishes limits that are well below ambient noise levels in the vicinity of the southern converter station and is therefore not considered relevant for this Project. Code 24-218 limits an increase in ambient noise levels by no more than 7 dBA at or after 10:00 p.m. and before 7:00 a.m. This limit is assessed at any point within a receiving property or within 15 ft (4.6 m) from a source on a public ROW. Additionally, NYC Zoning Ordinance 42-213 lot-line noise limits, specifies octave band noise limits at the lot line of the parcel containing the noise. The greater the octave band noise center frequency, the lower the maximum permitted sound pressure level at the lot line. See Table 3 in Appendix K: Pre-construction Noise Impact Assessment to this Exhibit for additional details. Because the southern converter station is located within the Astoria energy complex, which is a limited access industrial site, the lot-line noise limits were assessed at the southern edge of the complex, not along the boundary of the parcel within the complex where the southern converter station is located.

4.11.2 Noise Analysis

Ambient noise levels were measured in the vicinity of the northern and southern converter stations in August 2022 in accordance with the relevant requirements of (1) American National Standards Institute (ANSI) standard S12.9, Quantities and Procedures for Description and Measurement of Environmental Sound – Part 2: Measurements of Long-term Wide-area sound, and (2) ANSI Type 1 measurement equipment. For the northern converter station, noise measurements were taken at four short-term locations for approximately 10 minutes at four different times on two different days and nights between August 24 and 25, 2022, in addition to two long-term noise monitors which continually measured ambient noise levels during the same time. For the southern converter station, noise measurements were taken at four short-term locations for approximately 10 minutes at four different times over two days between August 23 and 24, 2022. No long-term monitoring was conducted due to lack of land access and equipment security. Monitoring locations are illustrated in Appendix K: Pre-construction Noise Impact Assessment to this Exhibit.

Noise-sensitive receptors, including residences, parks, institutional facilities, schools, and hospitals, were identified near both the northern and southern converter stations. Receptors were identified based on a review of address points and aerial imagery with a confirmation of receptor locations made during the ambient measurement survey.

Noise levels from construction were based on measured construction equipment noise from other projects, equipment manufacturers' data available online, or those published by the Federal Highway Administration's Roadway Construction Noise Model (RCNM) v1.1. These reference levels were used to estimate construction noise emissions at nearby receptors. Impact was assessed primarily on the basis of proximity to construction, length of construction activities, and the hours of construction.

Noise levels from the operation of the northern and southern converter stations were estimated at 10 representative noise-sensitive receptor locations around the southern converter station and 20 noise-sensitive receptors near the northern converter station using a mathematical model of noise emissions created using SoundPLAN, an acoustic modeling software package. Noise levels from the operation of the

Facility were predicted using the International Organization for Standardization (ISO) Standard 9613-2:1996, Attenuation of Sound During Propagation Outdoors - Part 2: General method of calculation. The noise sources associated with the operation of the converter stations include the following: converter transformers and associated cooling fans, converter power electronics equipment within the converter station, auxiliary equipment in the services building, converter cooler, air handling units, and AC reactors. Associated noise emission levels for each of these sources based on data for similar HVDC noise models on other projects were modeled. Mitigation measures, such as noise barrier walls, were included in the SoundPLAN model.

The potential impact of the estimated noise emissions was assessed according to the requirements and guidelines of the NYSDEC policy Assessing and Mitigating Noise Impacts (revised 2001), applicable portions of the NYSDPS General Recommendations for Applications for Substations, Stations, and Converter Stations under Article VII (2020), and applicable local laws.

4.11.3 Existing Sound Environment

The area surrounding the northern converter station includes mainly rural residential and agricultural land uses. Sources of existing sound include local traffic, aircraft overflights, and natural sources such as birds, insects, streams, and wind. A total of 73 noise-sensitive receptors within approximately 1 mile of the northern converter station were identified and the location of the 19 nearest noise-sensitive receptors were mapped (see Appendix K: Pre-construction Noise Impact Assessment to this Exhibit). Based on noise measurements, ambient noise levels in the northern converter station area follow a typical diurnal pattern, with louder levels during the day due to distant traffic or other human activity. During both daytime and nighttime hours, ambient noise levels are primarily driven by natural sources such as insects, frogs, or running water. Measured average short-term ambient noise levels ranged from 35-44 L_{90} dBA for the daytime and from 41-43 L_{90} dBA for the nighttime. The average measured ambient long-term noise levels were 43 L_{90} dBA daytime and 44 dBA for nighttime.

The immediate area surrounding the southern converter station is industrial (Astoria energy complex). The land use south of 20th Avenue is a mix of residential and commercial. Due to the dense urban nature of the study area surrounding the southern converter station, each noise-sensitive receptor was not identified. Instead, 10 locations were selected that would adequately represent all noise-sensitive receptors in the area (see Appendix K: Pre-construction Noise Impact Assessment to this Exhibit). Sources of existing sound include distant and local traffic, distant industrial operations, aircraft overflights, pedestrians, as well as natural sources such as birds and wind. Measured average short-term ambient noise levels ranged from 49-55 L_{90} dBA for the daytime and from 48-53 L_{90} dBA for the nighttime.

4.11.4 Potential Noise Impacts and Mitigation

Converter Station Construction Noise

Construction of the northern and southern converter stations will involve typical construction equipment, such as dump trucks, excavators, cranes, and forklifts. It might require pile driving and blasting. Construction will occur in phases, with some louder than others. The phases include site clearing and grading, foundation and underground equipment installation, building and equipment erection, and final site work. The predicted one-hour average noise levels ($L_{eq(1Hr)}$) construction levels at the nearest receptors to the northern converter station range from 42 to 62 dBA.

For the southern converter station, the predicted $L_{eq(1Hr)}$ construction levels at the 10 representative receptors near the station range from 34 to 62 dBA.

To minimize the impacts of construction noise at both the northern and southern converter stations on nearby receptors, the following mitigation measures will be considered by the Applicant, although some of these measures may only be applied at the northern converter station given the lower ambient levels at that site:

- Maintenance of equipment to manufacturers' specifications, particularly mufflers.
- Use of ambient controlled broadband backup alarms versus tonal backup alarms if using mobile equipment at night.
- Minimizing backing up on-site of delivery trucks to the degree practicable.
- Educating contractors and subcontractors on the need to minimize noise emissions.
- Providing a 24-hour telephone complaint number for residents to use if needed.
- Contacting all complainants and attempting to resolve any legitimate problems or issues in a prompt manner.
- Notifying residents of the expected construction schedule for the Project.
- Notifying the community in advance of particularly loud activities, such as pile driving.

Horizontal Directional Drill and Horizontal Auger Bore Construction Noise

HDD operations at various locations along the proposed transmission line corridor will create construction noise associated with entry and exit work. Noise levels were predicted at four representative distances: 100, 200, 500, and 1,000 ft (30, 61, 152, and 305 m) using the RCNM v1.1. Model results indicate that predicted noise levels at less than 100 ft (30 m) from HDD activities would be greater than 78 dBA $L_{eq(1Hr)}$, 72-78 dBA $L_{eq(1Hr)}$ at 100-200 ft (30 to 61 m), 64-72 dBA $L_{eq(1Hr)}$ at 200-500 ft (61 to 152 m), 58-64 $L_{eq(1Hr)}$ at 500-1,000 ft (152 to 305 m), and less than 58 $L_{eq(1Hr)}$ at less than 1,000 ft (305 m). If residences are located within approximately 200 ft (61 m) of HDD activities, the Applicant will consider mitigation measures to minimize noise disturbance. Additional details will be provided in the Applicant's EM&CP based on final Project design.

Converter Station Operational Noise

The northern converter station is in a relatively rural, quiet area; therefore, the 35 dBA limit at non-participating noise-sensitive receptors is warranted and was applied. Predicted noise levels from the operation of the northern converter station for the 10 closest non-participating receptor's range from 31 to 40 dBA. With the mitigation measures discussed below, predicted noise levels were reduced by an average of 5.1 dBA and range from 28 to 34 dBA. Consequently, the 35 dBA limit is met with mitigation.

The following mitigation measures, or their equivalent, would need to be implemented to achieve the Project's goals based on the current design of the northern converter station:

- A 30-ft (9.1-m)-tall noise barrier will be constructed on the eastern and western sides of the converter transformers.
- A 20-ft (6.1-m)-tall noise barrier will be constructed around the converter hall air handing units.
- A 20-ft (6.1-m)-tall noise barrier wall will be constructed along the northern property line.

Predicted noise levels from the operation of the southern converter station at the 10 receptor locations with the highest predicted noise levels range from 39.3 to 41.5 dBA. These represent an increase over ambient conditions ranging from 0.5 to 0.9 dBA. Noise from the southern converter station is predicted to cause an increase in existing ambient noise levels of 2 dBA or less at the nearest receptors, and the station is expected to be inaudible much of the time. The predicted increase in noise levels meets the NYSDEC recommendation of no more than 3 dBA ideally and no more than 6 dBA in any case. At the local level, the predicted noise levels along the southern edge of the Astoria energy complex on 20th Avenue comply with the NYC Zoning Ordinance 42-213 lot-line noise limits. However, if the lot-line noise limits apply within the complex, to the interior parcel boundary of the southern converter station, the Applicant will request a waiver from this ordinance.

4.12 Electromagnetic Fields

This section describes EMF that would be generated at specific locations along the proposed transmission line and assesses the potential for EMF impacts during construction and operation of the Project. More information regarding EMF is provided in Appendix L: Magnetic Field Simulation Report to this Exhibit.

4.12.1 EMF Study

The Applicant calculated magnetic fields that would be produced by the proposed terrestrial transmission line at eight selected cross-sections. These cross-sections represent various cases along the route, including co-location of the proposed terrestrial transmission line within the NYPA Marcy South ROW, location within a proposed new easement, within railroad property, and at a road crossing. Additionally, potential magnetic field strength was calculated for one submarine transmission line cross-section. The nine cross-sections were selected because they represent the worst-case EMF scenarios, e.g., they reflect the most existing transmission infrastructure, the narrowest ROW, and/or the shallowest cover depths.

Magnetic fields were calculated at the centerline, at a height of 1 m above ground, and at the edge of the ROW for the eight terrestrial cross-sections and were compared to the magnetic field standard for the State of New York, as set forth by NYSPSC.[7] This standard is 200 mG measured at the edge of the ROW, 1 m above ground. The simulated magnetic fields were calculated for the proposed terrestrial transmission line alone, as well as a combined value, taking into account the magnetic fields associated with the existing overhead transmission lines where the proposed transmission cable corridor would be co-located within NYPA and NYSEG ROW.

Additionally, for the submarine cross-section, magnetic field levels were calculated at the centerline at a height of 0 m and 1 m above the riverbed, assuming 2 ft of cover (greater burial depths are expected along most of the submarine transmission line route). A magnetic field strength was only calculated at the centerline given the lack of underwater ROW. The submarine cross-section calculations were performed for informational purposes to assess potential for environmental impacts to marine species.

Electric field levels for the proposed transmission cable were not calculated due to the nature of the proposed installation. The concentric neutral wires create a grounded cage around the cable core that

[7] Cases 26529 and 26559, *Proceeding on Motion of the Commission as to Regulations Regarding Electric and Magnetic Field Standard for Transmission Lines*, Statement of Interim Policy on Magnetic Field of Major Electric Transmission Facilities (issued and effective September 11, 1990).

reduces the electric fields around the outside of the cables. With the cables buried in a trench, the soil cover further reduces the electric field levels to negligible values.

4.12.2 Existing EMF Conditions

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

4.12.3 Potential EMF Impacts

There are no anticipated EMF impacts during construction of the Project. The electrical equipment associated with the converter stations and the Project's transmission lines will not be energized until the entire Project is operable.

The EMF study concluded that the magnetic field density produced by the newly proposed underground CPNY HVAC and HVDC cables does not cause an exceedance of the 200 mG standard set forth by NYSPSC. Magnetic fields produced by the existing AC overhead transmission lines have also been calculated and combined with the magnetic fields produced by the CPNY cables. The combined results obtained are compliant with the 200 mG standard in all but one of the cases analyzed, where a pre-existing exceedance exists, as previously documented in NYSDPS Cases 26529 and 26559. In comparison, according to the National Centers for Environmental Information, the Earth's magnetic field density is roughly between 250 and 650 mG. Therefore, the magnetic fields generated by the Project along the terrestrial corridor are not expected to have significant impacts on the environment.

Given the electrical properties of the new infrastructure proposed – shielded insulated cable – electric fields from operation of the proposed HVDC transmission line are expected to be negligible and would not have an effect along the terrestrial corridor.

Discussion of EMF effects with respect to habitat and organisms along the submarine transmission line corridor is presented in Sections 4.10 and 4.11, above.

4.13 Air Quality

This section describes the existing conditions related to air resources and potential air emissions from the construction and operation of the Project. The air quality regulatory framework and the affected air quality environment applicable to the Project are described. Examples of mitigation are described that could be implemented, if needed, to avoid, minimize, and/or mitigate potential impacts to air quality.

4.13.1 Federal Air Quality Regulations

The federal Clean Air Act, 42 U.S.C. 7401 et seq., is the guiding legislation for control of air pollution in the United States. EPA is responsible for developing and enforcing the regulations protecting air quality. Project emissions associated with construction, operations, and decommissioning will be subject to these EPA regulations governing air quality. Within New York, NYSDEC provides regulations for control of air pollution at the State level.

4.13.1.1 National Ambient Air Quality Standards

The Clean Air Act established the National Ambient Air Quality Standards (NAAQS) for the following air pollutants known as criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO2), ozone, particulate matter, and sulfur dioxide (SO2). The standards are reviewed every five years to incorporate the

most recent scientific data, and revised if needed by EPA to protect public health and the environment. The NAAQS consist of primary and secondary standards. The primary standards protect the general public's health as well as the health of sensitive populations, such as asthmatics, children, and the elderly (EPA 2022). The secondary standards protect the environment and public welfare from adverse effects associated with air pollution, including decreased visibility and damage to animals, crops, vegetation, and buildings (EPA 2022).

Most of the criteria pollutants are directly emitted into the atmosphere by industrial and combustion processes. Ozone is not directly emitted but forms by chemical reactions in the atmosphere between volatile organic compounds (VOCs) and oxides of nitrogen (NOX) in the presence of sunlight. In this context, EPA regulates VOCs and NOX, referred to as ozone precursors, to achieve compliance with the ozone NAAQS.

Particulate matter is a mixture of solid particles and liquid droplets of varying size. There are NAAQS for two different particles size ranges: particulate matter less than 10 microns in diameter (PM10) and particulate matter less than 2.5 microns in diameter (PM2.5). Particulate matter is emitted directly from combustion sources or mechanically generated from soil surfaces or other sources such as vehicle brake and tire wear. PM2.5 can also form in the atmosphere by chemical reactions between PM2.5 precursor compounds SO2, NOX, VOCs, and ammonia. EPA also regulates PM2.5 precursors to achieve compliance with the PM2.5 NAAQS.

The NAAQS for each criteria pollutant are presented in Table 4-22. NYSDEC monitors compliance with the NAAQS through a State-wide network of air pollution monitoring stations and compiles these data and submits them to EPA. On a pollutant-by-pollutant basis, if the air pollutant concentration data do not exceed the applicable NAAQS, the area is designated an attainment area. If ambient air pollutant concentration data show exceedance of the NAAQS for one or more pollutants, the area is designated a nonattainment area for the pollutants exceeding a NAAQS. For areas designated as nonattainment, New York State is required to develop an implementation plan to achieve compliance with the NAAQS. Once a nonattainment area demonstrates compliance with the NAAQS, the area becomes subject to a maintenance plan to prevent returning to a nonattainment designation.

Table 4-22. National Ambient Air Quality Standards

Air Pollutant	Primary/ Secondary	Averaging Time	Level	Form
CO	Primary and Secondary	8 hours	9 ppm	Not to be exceeded more than once per year.
		1 hour	35 ppm	
Lead	Primary and Secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded.
NO_2	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over three years
	Primary and Secondary	1 year	53 ppb	Annual mean.
Ozone	Primary and Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over three years.
SO_2	Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over three years.
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year.
PM_{10}	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over three years.

Air Pollutant	Primary/ Secondary	Averaging Time	Level	Form
$PM_{2.5}$	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over three years.
	Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over three years.
	Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over three years.

Source: EPA 2022
Note: NAAQS as of April 5, 2022
Key: CO = carbon monoxide; NO_2 = nitrogen dioxide; Pb = lead; $PM_{2.5}$ = fine particulate matter smaller than 2.5 micrometers in diameter; PM_{10} = respirable particulate matter smaller than 10 micrometers in diameter; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide; µg/m^3 = micrograms per cubic mete

4.13.1.2 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are pollutants known or suspected to cause adverse health and environmental effects. Adverse health effects associated with exposure to HAPs include increased likelihood of developing cancer and other serious health effects such as reproductive effects, birth defects, or other adverse environmental effects (EPA 2022a). EPA has not established ambient air quality standards for HAPs; instead, HAP emissions are regulated using national emissions standards and permit requirements. Within New York State, NYSDEC assesses the potential ambient air quality impact of HAP emissions through 6 NYCRR Part 212 and the DAR-1 "Guidelines for the Evaluation and Control of Ambient Air Contaminants Under 6 NYCRR Part 212" guidance document.

4.13.1.3 Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere and contribute to global warming (EPA 2022b). Primary GHGs include carbon dioxide, methane, and nitrous oxide, which can be released into the atmosphere through the production, transportation, and burning of fossil fuels. Carbon dioxide is the predominant GHG in the atmosphere. EPA has not established ambient air quality standards for GHGs; instead, GHG emissions are regulated using national emissions standards and permit requirements.

In New York, the Climate Leadership and Community Protection Act (CLCPA) has been established to achieve GHG reductions to do New York's part in helping mitigate climate change. The CLCPA has several major goals, one of which is to realize zero-carbon electricity by 2040.

4.13.1.4 New Source Review Permitting Program

Prior to constructing an emission source, EPA's New Source Review (NSR) regulations govern the review of a project to ensure that new emission sources do not contribute to a violation of the NAAQS (EPA 2022c). Pollutants regulated by the NSR permitting program include the criteria pollutants, VOCs, and some HAPs. In New York, the major source thresholds for attainment areas are 100 tons per year (tpy) for all NSR-regulated pollutants (6 NYCRR § 231-13.5); thresholds are 50 tpy for VOCs and 100 tpy for NOX in moderate ozone nonattainment areas, and 25 tpy for VOCs and NOX in severe ozone nonattainment areas. Counties in the New York Metropolitan Area are in severe ozone nonattainment. The transmission line (as well as wind and solar generation) components of the Project will not be major sources for any air pollutants regulated under NSR because these Project components will not include facilities that combust a significant amount of fossil fuels (likely used only in emergency generator engines if installed), and thus, the potential emissions are expected to be well below major source thresholds.

4.13.1.5 New Source Performance Standards

New Source Performance Standards (NSPS) regulate specific source categories for various industries and emission source types. The source types include engines that may, for example, power emergency generators that may be used at Project facilities to provide emergency electricity. Emission sources covered by an NSPS must meet specific requirements defined in the NSPS to control emissions. Requirements of an NSPS are included in air permits issued to a facility.

For some source types, National Emission Standards for Hazardous Air Pollutants (NESHAPs) also apply. Emergency generator engines are one type of source that has an applicable NESHAP. However, in this case, if an engine has been certified to the applicable NSPS, it also complies with the applicable NESHAP.

4.13.1.6 Marine Vessel Regulations

Marine vessels used for the Project and constructed on or after January 1, 2016, are required to meet the Tier III NOX standard established by the International Maritime Organization and other marine vessel emission requirements found in 40 CFR Part 1043.

4.13.2 New York State Regulations

NYSDEC develops and enforces State environmental regulations under Title 6 of the NYCRR. For some federal air quality regulations, EPA delegates authority to NYSDEC for implementation. Air quality regulations are found in 6 NYCRR Parts 200 through 317. There are several State air quality regulations that could apply to the Project, with applicability depending on the equipment installed at Project sites, as listed below:

- 6 NYCRR Part 201 Permits and Registrations
- 6 NYCRR Part 211 General Prohibitions - prohibit creating air pollution that is injurious to health or that unreasonably interferes with the comfortable enjoyment of life or property. Visible emissions are included under general prohibitions.
- 6 NYCRR Part 222 Distributed Generation Sources – would not apply to emergency generators that may be located at a project location if they are only used for emergency situations.
- 6 NYCRR Part 225 Fuel Composition and Use – any fuel burning must meet fuel sulfur limitations of no more than 0.0015% sulfur by weight.
- 6 NYCRR Part 227 Stationary Combustion Installations – if a stationary source, such as an emergency generator engine, is part of a project site, it may be subject to requirements of this regulation.
- 6 NYCRR Part 231 New Source Review for New and Modified Facilities – would apply only if potential emissions are greater than the thresholds for a major New Source Review source, as defined in 6 NYCRR Part 201.

4.13.3 New York City Regulations

For Project components located within the limits of the City of New York, certain regulations may apply. Applicability will depend on the type of equipment installed and level of activity. Construction activities within the City would also be required to comply with City regulations, as described below and discussed further in **Exhibit 7: Local Ordinances**.

4.13.3.1 Rules of the City of New York

Title 15, Chapter 13 of the Rules of New York City provides for dust prevention regulations that apply to all construction activities occurring within New York City.

4.13.3.2 New York City Administrative Code

Title 24 of the New York City Administrative Code, Environmental Protection and Utilities, contains several regulations that may apply to Project facilities depending on the type and size of affected equipment installed, including:

- §24-109 Registrations – would apply to emergency generator engines with energy input or output withing ranges specified in this section;
- §24-141 Emission of odorous air contaminants;
- §24-142 Prohibits emission of smoke exceeding opacity level 2 on the standard smoke chart;
- §24-143 Prohibits emission of visible air contaminants from internal combustion engines;
- §24-146 Regulates particulate matter (dust) from becoming air-borne; and
- §24-148 Architectural coatings – prohibits use of coatings containing photochemically reactive solvents.

4.13.3.3 New York City Zoning Resolution

Article IV, Chapter 2 of the New York City Zoning Resolution contains use regulations for activities located in manufacturing districts that may apply to facilities within New York City, including:

- §42-23 Performance Standards Regulating Smoke, Dust and Other Particulate Matter;
- §42-24 Performance Standards Regulating Odorous Matter; and
- §42-25 Performance Standards Regulating Toxic Noxious Matter.

4.13.4 Existing Air Quality Conditions

For the northern portion (Delaware, Sullivan, and Orange Counties) of the transmission line corridor, Delaware and Sullivan Counties are in the Southern Tier East Intrastate Air Quality Control Region (AQCR), and Orange County is in the Hudson Valley Intrastate AQCR. For the southern portion (from Dutchess County south to Queens County), the counties are in the New York/Northern New Jersey-Long Island, NY-NJ-CT AQCR.

The NYSDEC Bureau of Air Quality Surveillance operates air pollution monitoring stations collecting meteorological data and ambient concentrations of criteria pollutants, VOCs, and air toxics across the State (NYSDEC 2020d). The data collected at these monitoring stations inform air pollution control programs and policies. Of the 58 State-wide monitoring stations, there are no stations in Delaware and Sullivan Counties, which reflects the rural character of the counties with low development density and good air quality. There are three monitoring sites in Orange County, one site in Rockland County and 11 stations monitoring air quality in Bronx, New York, and Queens Counties within New York City (NYSDEC 2020d).

Rockland, Westchester, and counties within New York City are currently designated as serious ozone nonattainment for the 2008 ozone NAAQS and moderate ozone nonattainment area for the 2015 ozone

NAAQS. Bronx, Westchester, and Queens Counties are maintenance areas for the 1971 CO NAAQS. Orange, Rockland, Westchester, and counties within New York City are designated as a maintenance area for the 2006 24-hour PM2.5 NAAQS and the 1997 PM2.5 NAAQS (EPA 2022d).

NYSDEC also operates an air toxics monitoring program. The program currently collects samples at 12 monitoring stations within the State's network of monitoring stations (NYSDEC 2022d). NYSDEC also analyzes samples taken at two EPA National Air Toxics Trends Sites in New York state (Rochester and Bronx). Data from 2006 to 2021 indicate that, in general, annual average concentrations of VOCs have decreased since 2006 (NYSDEC 2022d).

NYSDEC issued the 2021 Statewide GHG emissions report pursuant to Section 75-0105 of the ECL. The inventory covers the period 1990-2019 (NYSDEC 2021b). GHG emissions are inventoried by sectors including energy, industrial processes and product use, agriculture/forestry/land use, and waste. GHG emissions increased between 1990 and 2005; however, since 2005, GHG emissions have been decreasing (NYSDEC 2021b). In 2019, statewide gross emissions were 379.44 million metric tons of carbon dioxide equivalent emissions (mmtCO2e GWP20), which is 6% lower than 1990 levels (NYSDEC 2021b).

4.13.5 Potential Air Quality Impacts and Mitigation Measures

Project-related air emissions are predominantly expected to result in short-term, minor impacts to air quality during construction activities and long-term minor impacts to air quality during operations. The CPNY Project as a whole will result in substantial air quality benefits in New York State, as described in this section.

4.13.5.1 Construction

Construction emissions would be produced during transmission line and supporting facility construction. Emissions would also occur due to transportation of Project-related components to Project construction sites. Project-related air pollutant emissions during construction would have short-term, localized impacts to air quality for some pollutants such as particulate matter and larger scale impacts for pollutants such as VOC and NOx which could lead to regional near ground ozone formation. Emissions of carbon dioxide, a GHG, would also occur.

Marine vessels used for construction of the submarine transmission line and landfalls will operate in New York State waters in the Hudson and Harlem Rivers. These vessels and the onboard construction equipment will use diesel engines burning low sulfur fuel. Vessels used for the Project would be expected to comply with applicable EPA, or equivalent, emission standards.

Construction activities for the terrestrial transmission line and converter stations will primarily use diesel-powered equipment. A localized increase in fugitive dust may result during terrestrial construction activities from various activities including site preparation and clearing, soil moving, and trenching for underground cable installation in the transmission corridor. Fugitive dust generated during construction of the terrestrial components of the Project will be managed in accordance with a fugitive dust control plan.

Emissions from vehicles, diesel engines, and/or nonroad diesel engines at all areas of construction will comply with applicable State regulations regarding idling. 6 NYCRR § 217-3 prohibits all on-road diesel-fueled and non-diesel-fueled heavy-duty vehicles from idling for more than five minutes.

Most of the construction carbon dioxide emissions would be produced by cable procurement which includes transport from overseas to New York by barge, specialized marine vessels, and trucks. Construction emissions would be temporary and would cease when construction activities end.

Mitigation may be required to address regulatory requirements and emission control plans that may be required as a result of regulatory agency review of project plans. Typical mitigation measures for construction emissions that may be employed as needed are summarized as follows:

- Marine vessels constructed on or after January 1, 2016, are required to meet the Tier III NOX standard established by the International Maritime Organization;
- On-land diesel-powered construction equipment and vehicles will use ultra-low-sulfur diesel fuel, per the requirements of 40 CFR § 80.510(b);
- Marine vessels will use low sulfur diesel fuel and be at or below the maximum fuel sulfur content requirement of 1,000 ppm established per the requirements of 40 CFR § 80.510(k); and
- Fugitive dust generated during terrestrial construction will be controlled in accordance with a fugitive dust control plan.

4.13.5.2 Operations

During operation and maintenance (O&M), potential emissions would result from the operation of equipment and from transport for O&M personnel. Routine operation over the Project lifetime would involve primarily O&M crew transport. If installed as part of the Project, backup/emergency diesel electric generators would add a negligible amount of emissions from routine testing as required by equipment manufacturers.

Estimated air emissions from O&M activities will be very low and are not expected to have a significant impact on regional air quality over the operational life of the Project.

Beyond the construction and operation impacts noted above, the Project would enable the delivery of wind and solar generation from throughout New York State in downstate New York, thus reducing the need for electricity generation from fossil fuel power plants and thereby reducing air pollutant and GHG emissions in the region and in local areas. Higher utilization of wind and solar generation enabled by the Project is expected to reduce statewide fossil fuel-based generation by 20 to 22%, and thus reduce annual emissions of key air pollutants such as oxides of nitrogen, sulfur dioxide, and particulate matter. Using more wind and solar based generation will reduce GHG (primarily carbon dioxide) emissions statewide by up to 49 million tons over a 25-year period.

By delivering clean energy into New York City (Zone J), the Project will reduce the output of oil- and gas-fueled generation sources by an average of 2.56 TWh per year in Zone J, a reduction of 16%. The Project will reduce statewide carbon emissions by 2.5 million tons in 2030 (the year in which New York State's goal is to reduce GHG emissions by 70%) with approximately 1.5 million tons (or 57%) of those projected GHG reductions occurring in Zone J.

4.14 Additional Mitigation and Protection Measures

4.14.1 Scenic, Recreational, and Historic Areas (16 NYCRR § 86.5(b)(2)(i)) and (iii)

16 NYCRR § 86.5. (b) The applicant shall state: (2) what efforts, if any, have been made to assure: (i) that any right-of-way avoids scenic, recreational and historic areas; (ii) that any right-of-way will be routed to minimize its visibility from areas of public view; (iii) that any right-of-way has been planned to avoid heavily timbered areas, high points, ridge lines and steep slopes.

The design of the Project as a buried HVDC transmission line significantly reduces visual impacts in comparison to an overhead transmission line. Furthermore, the proposed transmission line will be constructed largely within existing ROW, thereby avoiding or minimizing siting new ROW within large forested areas, along ridges, or on steep slopes or high points. Nevertheless, the Applicant performed a visual impact assessment of the Project (see Section 4.3 and Appendix C: Visual Resources Assessment). As discussed in Section 4.3, the results of the assessment show that clearing associated with the proposed transmission line will result in minimal visual change due to the existence of considerable existing forest and woodlots that will remain after clearing.

The Applicant also completed an architectural assessment to evaluate potential impacts to historic resources in proximity to the aboveground Project components (i.e., northern and southern converter stations). As discussed in Section 4.4.5.3, the Applicant determined that no direct or visual impacts to historic architectural properties are anticipated because of the Project.

As discussed in Section 4.2.5, portions of the proposed terrestrial transmission line corridor and three of the landfall sites cross or are located on parks or recreation areas. Recreation areas crossed by the terrestrial transmission line corridor are within existing transmission line, highway, or other road ROWs. The Applicant is not proposing to deviate from the ROWs to avoid the recreation areas because impacts to the recreation areas will be temporary; impacts will not interfere with long-term use or management of the recreation areas; and deviating from the ROWs would result in increased land use and natural resource impacts from establishment of greenfield ROW. The Applicant will identify site-specific mitigation and protection measures for Project facilities on these recreation areas through continued coordination with the responsible land managing agencies. Such measures will be included in the EM&CP.

No rivers designated as National or State Wild, Scenic, or Recreational are crossed by the proposed corridor.

As discussed in Section 3.7 of **Exhibit 3: Alternatives**, the Applicant evaluated various alternatives to the Croton Point and Randall's Island East and West landfalls which are on public parkland. However, because impacts to the parklands at these landfall sites will be temporary and there will be no long-term impacts to park use or management, and considering the community and traffic impacts associated with those alternatives, the Applicant is not proposing to adopt any of the alternative landfall sites.

4.14.2 Right-of-Way Siting (16 NYCRR § 86.5(b)(2)(iii))

16 NYCRR § 86.5. (b) The applicant shall state: (2) what efforts, if any, have been made to assure: (iii) that any right-of-way has been planned to avoid heavily timbered areas, high points, ridge lines and steep slopes.

Section 3.6 of **Exhibit 3** documents two locations where the proposed corridor deviates from existing ROW. The corridor in these areas was selected to avoid and minimize impacts to natural resources such as streams, wetlands, and forested areas to the greatest extent possible. However, each deviation will require varying amounts of forest clearing of new ROW, in some cases on steep terrain. For these two deviations, the Applicant determined that routing off the existing ROW is preferred to allow for trenchless crossings of Beaver Kill and the Neversink River. As an additional consideration, most of the areas cleared along new ROW will be allowed to regrow because the underground transmission line will only require an approximately 40-ft-wide (12.2-m-wide) permanently maintained ROW.

4.14.3 Natural Landscape and Land Use (16 NYCRR § 86.5(b)(2)(iv))

16 NYCRR § 86.5. (b) The applicant shall state: (2) what efforts, if any, have been made to assure: (iv) that the selection of any proposed right-of-way preserves the natural landscape and minimizes conflict with any present or future planned land use;

The proposed transmission line will be constructed entirely underground or underwater and largely within existing ROW, thereby preserving the natural landscape and minimizing conflicts with any present or future planned land uses.

Construction of the northern converter station on an undeveloped parcel would alter the landscape in the immediate area but, given the location of the site adjacent to parallel sets of NYPA and NYSEG overhead transmission lines and within 1 mile of the Fraser Substation, any localized effects of this alteration are minimized. Construction of the southern converter station on a previously developed parcel will avoid impacts to the landscape and land use conflicts.

Potential encroachments within the proposed ROW would be surveyed, and individual abutting property owners or occupants would be contacted to address potential encroachments on a case-by-case basis. Any additional encroachments identified during the preparation of the EM&CP would be similarly addressed. Adjacent landowners would be afforded the opportunity to remove any encroaching structures or uses prior to the start of construction.

4.14.4 Right-of-Way Clearing Widths (16 NYCRR § 86.5(b)(3))

16 NYCRR § 86.5. (b) The applicant shall state: (3) what, if any, plans have been formulated to keep any right-of-way clearing to the minimum width necessary to prevent interference of vegetation with the proposed facility;

The selection of HVDC technology and underground siting of the transmission line substantially reduce the required width of ROW clearing compared to that which would be required for overhead HVAC transmission lines with 1,300 MW of capacity. The Applicant anticipates that an approximately 40-ft-wide area will be required to remain free of woody vegetation over the transmission line (the Applicant will refine the width of the permanent maintained corridor during final design and include updated impact calculations, as necessary, in the EM&CP). In addition, the transmission line is predominantly sited in existing ROWs already subject to vegetation maintenance. In areas where the transmission line is installed using trenchless methods no vegetation clearing will be required, other than for workspace needed at the entry and exit pits and associated access. Where the transmission line corridor crosses or is adjacent to forested areas along the NYPA ROW and within the I-84 median, the Applicant will attempt to route the transmission line to avoid or minimize the amount of clearing needed to maintain the line. Additional details regarding permanent ROW widths and vegetation clearing will be provided in the EM&CP.

4.14.5 Soil Stability, Protection of Vegetation and Adjacent Resources (16 NYCRR § 86.5(b)(4))

16 NYCRR § 86.5. (b) The applicant shall state: (4) what, if any, schedule or method of clearing the right-of-way has been formulated to take into account soil stability, protection of natural vegetation, and the protection of adjacent resources (including the protection of any natural habitat for wildlife);

The Applicant will coordinate the construction activities of all consultants and contractors to ensure that appropriate environmental standards are met. Where possible, existing natural vegetation buffers will be maintained adjacent to highway crossings, streams, rivers, and wetlands. The placement of cable splice pits or vaults in wetland areas and on steep slopes will be avoided where possible. During construction and operation, the Applicant will comply with all applicable water quality standards for streams and wetlands, as required.

4.14.5.1 Soil Stability

Impacts associated with soil disturbance (erosion, sedimentation) have been minimized by siting the Project within the previously disturbed ROW to the maximum extent possible. Specific erosion control measures will be provided as a part of the final construction documentation and both the SWPPP and EM&CP to be developed for this Project. Prior to commencing construction activities, erosion and sediment controls will be installed, as needed, between the work areas and any downslope surface waters or wetlands, to reduce the risk of soil erosion and siltation. Following construction, disturbed areas will be stabilized and restored in accordance with the EM&CP.

4.14.5.2 Protection of Natural Vegetation

Mitigation measures to avoid or minimize impacts to vegetation during construction will include:

- Identifying and delineating sensitive areas where no disturbance or vehicular activities are allowed without specialized BMPs;
- Educating the construction workforce on respecting and adhering to the physical boundaries of off-limit areas;
- Employing BMPs during construction; and
- Maintaining an organized and safe work area within the designated construction sites.

Following construction activities, temporarily disturbed areas will be seeded (and stabilized with mulch if necessary), to reestablish vegetative cover in these areas. Other than in active agricultural fields, annual rye or a seed mix of native plant species appropriate to the Project area will be used to revegetate these areas. Restoration procedures will be detailed in the Project's EM&CP.

In areas used for agricultural production, measures to protect and restore agricultural lands will be implemented during and after construction in accordance with NYSAGM guidelines or landowner/agricultural operator requests to minimize adverse impacts to the extent practicable. An agricultural inspector will be on-site to ensure compliance with commitments made to NYSAGM and/or landowners. The Applicant will also work with landowners and NYSAGM regarding compensation for crop loss or damages suffered during construction activities. See Section 4.2.6.1 for further discussion of measures proposed to avoid or mitigate impacts to agricultural land.

4.14.5.3 Protection of Adjacent Resources (including the protection of natural habitat for wildlife)

To reduce the potential introduction or spread of invasive plant species in regulated areas, the Applicant will prepare an Invasive Species Management Plan that may include implementation of the following measures, as appropriate: (1) construction materials inspection, (2) construction equipment sanitation, (3) inspection of spoil and fill material to ensure no invasive species are present, and (3) proper site restoration.

Impacts to fish and wildlife resources will be limited by reducing on-ROW and off-ROW disturbance to the extent possible. By routing the transmission line and confining most construction activity to the existing ROWs, incidental injury and mortality and habitat alteration will be minimized. Silt and sedimentation impacts on aquatic species will be avoided or reduced to the extent practicable using sediment and erosion controls as will be described within the EM&CP. Trenchless crossing methods will be employed to the extent practicable for sensitive stream and wetland crossings. Site-specific crossing methods, which the Applicant is currently developing in consultation with NYSDPS and NYSDEC, will be depicted on the construction drawings contained within the EM&CP. Areas disturbed during construction will be restored to their pre-construction soil profile and contours, seeded with an annual rye or native seed mix, and allowed to revegetate naturally.

ROW management will involve periodic maintenance to maintain early successional vegetation in accordance with or as complement to the adjacent ROW owner's procedures. The Proposed ROW would thus continue to provide food and cover for wildlife that prefers old-field and shrub-dominated habitat. Along classified trout streams crossed by the transmission line (and other stream crossings where possible), vegetated streamside buffer areas would be maintained to the extent practicable to provide fish cover, wildlife travel corridors, and shade (to maintain cool water temperature).

Impacts to wetland and streams from vehicle crossings will be minimized by using existing crossing locations whenever possible, and construction matting for new wetland crossings. Crossing methods as identified above, equipment restrictions, and erosion and sedimentation control measures will be used to reduce impacts to water quality, surface water hydrology, and aquatic habitat.

Where crossings of surface waters and wetlands are required, the Applicant will employ the BMPs associated with streamside and wetland activities. Specific mitigation measures for protecting wetlands and surface water resources will be applied where practicable, and may include the following:

- *No Equipment Access Areas*: Where impacts are not otherwise permitted, "No Equipment Access," will be designated to confine the use of motorized equipment to designated access roads and work areas only.
- *Restricted Activities Area*: Where practicable, a 100-ft (30.5-m) adjacent area for state-regulated wetlands and 50 ft (15.2-m) for state-protected streams, referred to as a "Restricted Activities Area," will be established where the transmission line crosses streams, wetlands, and other bodies of water. Restrictions may include:
    - No deposition of cut slash or loose branches within or adjacent to a waterbody;
    - No excess fill, construction material, or debris will be stockpiled or stored in wetlands and state-regulated wetland adjacent areas;
    - Restoration of stream banks immediately following open trench crossing;

  - No equipment cleaning, washing, or refueling; and
  - No storage of any petroleum or chemical material.

- *Stream and Wetland Crossings*: Watercourses will not be obstructed in such a way that impedes the movement of water during vehicle/equipment crossings or installation of the transmission line. Where streams are crossed using open trench methods, any flow present at the time of construction will be conveyed around the work area using dam and pump or flume pipe techniques. Temporary bridges will span the stream from top of bank to top of bank with a clearance at least 3 ft (0.9 m) above mean high water mark. Temporary crossings will be removed, and the water resource will be restored to preexisting conditions following removal of temporary crossings. When trenching in wetlands, the top 1 ft (0.9 m) of topsoil will be segregated, except in areas where standing water is present or soils are saturated. After backfilling is complete, the segregated topsoil will be returned to its original location.
- *Sediment and Siltation Control*: A formal soil erosion and sedimentation control plan will be included as part of the EM&CP to be submitted at a later date. Areas of exposed soil resulting from Project construction will be seeded and/or mulched to minimize erosion and siltation. At wetland crossings, sediment barriers will be installed across the construction ROW upslope of the wetland boundary where necessary to prevent sediment flow into the wetland. The transmission line trench will be dewatered in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland or stream. Dewatering structures will be removed as soon as practicable after the completion of dewatering activities.
- An Environmental Monitor will be on-site throughout construction to determine if changes to the SWPPP and sediment and erosion control measures are necessary. Such measures would be implemented on an as-needed basis to ensure the protection of water quality in surface waters, wetlands, and/or groundwater that could be impacted by the Project. Where control devices are installed, they would be inspected throughout the duration of construction until completion of all restoration work (final grading and seeding), to ensure that they remain functional and effective. Inspections would occur at a minimum once weekly and following any significant storm events.

The type and descriptions of all proposed wetland and stream crossings have not yet been determined but will be provided in the EM&CP. To ensure minimization of impacts to wetland resources during construction, the Applicant would provide the construction contractor copies of the EM&CP, applicable USACE permits (Section 404), 401 Water Quality Certification, and site-specific plans detailing construction methodologies and natural resource protection measures.

Fuel storage and vehicle refueling restrictions would be employed to protect against leaks or accidental spilling of equipment fuels or lubricants. Appropriate emergency cleanup procedures will be developed to ensure proper agency notification (if necessary) and clean-up of any spills to mitigate the potential impact of such occurrences.

4.14.6 Protection of Vegetation and Topsoil Not Cleared (16 NYCRR § 86.5(b)(5))

16 NYCRR § 86.5. (b) The applicant shall state: (5) what, if any, plans have been made to protect vegetation and topsoil not cleared, from damage from construction and operation of the facility;

Mitigation measures to be taken to avoid or minimize impacts to vegetation and soil not cleared by the Project during construction will include:

- Identifying, delineating, and staking/flagging sensitive areas (such as wetlands) where no disturbance or vehicular activities are allowed;
- Educating the construction workforce on respecting and adhering to the physical boundaries of off-limit areas;
- Employing BMPs during construction; and
- Maintaining an organized and safe work area within the designated construction sites.

ROW management will involve periodic maintenance to maintain early successional vegetation in accordance with or as complement to the adjacent ROW owner's procedures.

4.14.7 Explosives and Pollutants near Waterbodies (16 NYCRR § 86.5(b)(6))

16 NYCRR § 86.5. (b) The applicant shall state: (6) what, if any, provision has been made to protect fish and other aquatic life from harm from the use of explosives or pollutants in or near streams and other bodies of water;

Any necessary blasting activities, including the transport, handling, and disposal of explosives and explosives packaging, will be conducted in accordance with applicable safety regulations and codes and performed only by certified and licensed blasters. Examples of such safety procedures include (but are not limited to) waiting to load holes with explosives until all holes in the given location are drilled, preventing construction vehicle access to areas with live explosives, and the use of and adherence to all warning horns and/or alarms signifying imminent blasts. Blasting mats would be used when necessary to minimize fly rock. Prior to blasting, the Applicant would determine if there are any structures or underground facilities in the area close to the work location. Blasting would not be performed in areas where subsurface facilities such as wells are located close to work areas.

Blasting notification would consist of prior notice to affected property owners and tenants, as well as the use of appropriate warning horns (or equivalent) immediately prior to a blast to warn construction workers and others who may be near the construction site. When requested by local authorities, the Applicant would provide notice of planned blasting at least four hours in advance.

4.14.8 Pesticides (16 NYCRR § 86.5(b)(7))

16 NYCRR § 86.5. (b) The applicant shall state: 7) what, if any, pesticide or herbicide will be used in construction or maintenance of the proposed facility (including the volumes and manner of use);

During construction and operation, the Applicant would follow the procedures and specifications in NYPA's systemwide long-range transmission ROW vegetation management plans and programs. Buffer zones, sometimes referred to as "set-back distances" or "no-spray zones," generally include sites adjacent to residences, streams, public resorts, scenic areas, restricted wetlands, open water, or other areas of special concern where direct application of certain herbicides and/or pesticides are limited. Any pesticides and herbicides determined to be used during construction and operation of the Project would be approved by NYSDEC for use in New York, and the Applicant would follow NYSDEC laws and regulations and EPA-registered label requirements in their use. All pesticide or herbicide application methods would be determined by the Applicant's ROW maintenance staff.

4.14.9 Appurtenant Structures (16 NYCRR § 86.5(b)(8))

16 NYCRR § 86.5. (b) The applicant shall state: (8) what, if any, plans have been made to locate and design appurtenant structures to minimize the environmental impact of the structures (including visual and noise disturbance); and

The Project proposes the installation of two new converter stations (northern converter station in Delhi, Delaware County; southern converter station in Queens, Queens County). The locations of these proposed facilities have been included in the environmental studies completed to date.

The proposed northern converter station will be located on an undeveloped parcel and require up to approximately 5 acres of permanent vegetation removal. No streams, wetlands, or floodplains will be impacted by the construction of the converter station at the site, and no protected species or important habitats are present. Further, no archaeological or historic resources will be affected. As stated in Section 4.3, the northern converter station will alter the character of the existing view. However, the visual impact of the northern converter station will be variable and largely dependent upon distance from the station, with proximity resulting in moderate visual contrast with existing visual landscape, and at greater distances, minimal to no impact on visual quality or existing character of the views. Furthermore, the northern converter station would only be visible within approximately 2.2% of its VSA with the remaining 97.8% of its VSA screened by vegetation, structures, and/or topography. As stated in Section 4.11, the Applicant will implement an appropriate design for the northern converter station to meet sound level design goals in accordance with NYSDPS and NYSDEC guidance documents.

The southern converter station is located in an industrial site on a developed parcel and will have no impact on natural or cultural resources. As stated in Section 4.3, the southern converter station will alter the character of the existing view. However, the visual impact of the southern converter station will be variable and largely dependent upon distance from the station, with proximity resulting in moderate visual contrast with existing visual landscape, and at greater distances, minimal to no impact on visual quality or existing character of the views. As stated in Section 4.11, the Applicant will implement an appropriate design for the southern converter station to meet sound level design goals in accordance with NYSDPS and NYSDEC guidance documents.

4.14.10 Cleanup and Restoration (16 NYCRR § 86.5(b)(9))

16 NYCRR § 86.5. (b) The applicant shall state: (9) what, if any, provisions have been made for cleanup and restoration of the project area after construction.

Cleanup and restoration activities will be conducted as construction work progresses along the transmission line. Once construction is complete, final site restoration will be conducted as required at any remaining disturbed sites in accordance with the approved EM&CP. In accordance with the General Guidelines for EM&CPs and issued Certificate Ordering Clauses, the Applicant will prepare detailed plan and profile drawings and an associated narrative depicting and describing restoration activities as part of its EM&CP to be filed with the Commission at a later date.

Cleanup activities will involve removal of all debris from the construction ROWs, with the exception of vegetation debris. Restoration activities will involve regrading disturbed soils to restore contours to their pre-construction condition or to match adjacent contours, repair of all streambeds and banks, and site stabilization and vegetation. Any stockpiled soil will be evenly redistributed near its former location within the construction ROWs. In areas with active agricultural land, restoration will occur in accordance with NYSAGM guidelines or alternative methods agreed to with certain landowners. Therefore, adverse impacts on active agricultural land will be minimized to the extent practicable. Site stabilization and restoration will

be achieved through seeding and mulching. All construction-related erosion control devices will be removed following revegetation.

4.14.11 Underground Facilities *(16 NYCRR § 86.5(c))*

16 NYCRR § 86.5. (c)(1) If any portion of the proposed facility is to be constructed underground, the applicant shall state what, if any, provisions have been made to avoid clearance of the entire right-of-way. If the clearance proposed will go to the mineral soil, the applicant shall state:(i) the width of the clearance; (ii) what, if any, provisions have been made for the replacement of topsoil removal during construction; (iii) what, if any, provisions have been made for removing excess soil excavated during construction; and (iv) what, if any, plans have been made for stabilizing the cleared area with vegetation and erosion control devices. (2) If any underground portion of the proposed facility will be constructed in or adjacent to a stream or other body of water, the applicant shall state: (i) what, if any, plans have been made to prevent erosion of the banks; (ii) what, if any, techniques (such as cofferdams) will be used; and (iii) what, if any, plans have been made to use the water from such streams or other bodies of water for pipe-testing or other purposes (including volumes of water involved and methods for release of water once used).

By proposing a corridor for the terrestrial transmission line that substantially utilizes existing ROW, the Applicant will significantly reduce the amount of clearing required to construct and maintain the Project.

Preparation of the construction corridor will likely include excavations for the transmission line trench which extend to the mineral soil. The trench width will be approximately 3 ft (0.91 m) wide. Topsoil will be excavated and segregated into separate stockpiles for reuse, with particular care exercised in wetland areas and/or stream/waterbody crossings. The trench will be backfilled using suitable native stockpiled materials approved for reuse. Imported materials will only be used as needed for performance requirements or to replace volumes deemed unsuitable for reuse. Where appropriate, the segregated topsoil will backfilled last so that the site can be reseeded and restored to pre-existing conditions as will be detailed in the EM&CP. All disturbed areas will be restored with native vegetation species and stabilized to prevent erosion.

Stream crossing methods being considered by the Applicant are discussed in Sections 4.1.4.7 and 4.1.4.8. As discussed in Section 4.1.4.8, stream crossings will be accomplished using methods to minimize impacts to stream flows, minimize bank erosion, reduce disturbance to streambed substrates, and prevent changes in slope (gradient). BMPs will include installation of erosion barriers and/or geo-textile cloth along riparian corridors, on stream banks, and between upland areas and streams as required. Sediment and erosion control measures for stream crossings will be implemented per the Project SWPPP and EM&CP. Vegetation clearing along stream banks will be limited to what is minimally required for construction. Soils and stream substrates will be stockpiled in locations away from streams to reduce the potential for sediment loading during rainfall events.

Withdrawal of water from streams or other waterbodies may be required to complete trenchless crossings of sensitive resources and other features. If water withdrawals are required, the Applicant will withdraw and discharge water in accordance with all relevant permit conditions. Additional details will be provided in the EM&CP.

4.15 References

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