TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

DRAFT REQUEST FOR AN INCIDENTAL HARASSMENT AUTHORIZATION

UNDER THE MARINE MAMMAL PROTECTION ACT

NORTHEAST SUPPLY ENHANCEMENT PROJECT

MAY 2019

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LIST OF ABBREVIATIONS AND ACRONYMS

AC	alternating current
AMAPPS	Atlantic Marine Assessment Program for Protected Species
μ	micro
AEP	auditory evoked potential
Caltrans	California Department of Transportation
CeTAP	Cetaceans and Turtle Assessment Program
CP	cathodic protection
CRESLI	Coastal Research and Education Society of Long Island, Inc.
CV	coefficient of variation
dB	decibel
DGPS	differential global positioning system
DP	dynamic positioning
DPS	distinct population segment
DSM	density surface model
DSV	diving support vessel
Dth/d	dekatherms per day
ECMON	ecosystem monitoring program
EEZ	exclusive economic zone
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FHWG	Fisheries Hydroacoustic Working Group
GARFO	NOAA Fisheries Service Greater Atlantic Regional Fisheries Office
GNRA	Gateway National Recreation Area
GIS	Geographic Information System
HDD	horizontal directional drill
Hz	hertz
ICES	International Council for the Exploration of the Seas
IHA	Incidental Harassment Authorization
kHz	kilohertz
LNYBL	Lower New York Bay Lateral
L_{pk}	peak sound pressure
μPa	micropascal
M&R	meter and regulating

MARMAP	marine resources monitoring, assessment, and prediction
MDth/d	thousand dekatherms per day
mg/L	milligrams per liter
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MMSC	Marine Mammal Stranding Center
MP	milepost
NAVFAC Atlantic	Naval Facilities Engineering Command Atlantic
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	U.S. Department of the Navy
NEFSC	Northeast Fisheries Science Center
NJDEP	New Jersey Department of Environmental Protection
NMFS	National Marine Fisheries Service (also NOAA Fisheries Service)
NOAA	National Oceanic and Atmospheric Administration
NODE	Navy OPAREA density estimate
NYSDEC	New York State Department of Environmental Conservation
OSP	Optimum Sustainable Population
Pa	pascal
PBR	potential biological removal
ppm	parts per million
Project	Northeast Supply Enhancement Project
PTS	permanent threshold shift
RDL	Rockaway Delivery Lateral
RFMRP	Riverhead Foundation for Marine Research and Preservation
RMS	root mean square
SAS	sighting advisory system
SEL	sound exposure level
SEL_{cum}	cumulative sound exposure level
SMA	seasonal management area
SPL	sound pressure level
SPUE	sightings per unit effort
TL	transmission loss
TNC	The Nature Conservancy
Transco	Transcontinental Gas Pipe Line Company, LLC
TTS	temporary threshold shift

UME	Unusual Mortality Event
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
WCNE	Whale Center of New England
Williams	Williams Partners L.P.
WSDOT	Washington State Department of Transportation
YoNAH	Years of the North Atlantic Humpback
ZOI	Zone of Influence

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1 DESCRIPTION OF THE ACTIVITY

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction to Proposed Activity

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of Williams Partners L.P. (Williams), is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters. To provide the incremental 400,000 dekatherms per day (Dth/d) of capacity, Transco plans to expand portions of its system from the existing Compressor Station 195 in York County, Pennsylvania, to the Rockaway Transfer Point in New York State waters. As defined in executed precedent agreements with National Grid, the Rockaway Transfer Point is the interconnection point between Transco's existing Lower New York Bay Lateral (LNYBL) and the existing offshore Rockaway Delivery Lateral (RDL).

The Northeast Supply Enhancement Project (Project) would consist of several components, including onshore pipeline facilities in Pennsylvania and New Jersey, offshore pipeline facilities in New Jersey and New York, and both new construction and modification of existing compressor stations and valve stations onshore in Pennsylvania and New Jersey. The offshore pipeline facilities would include the installation of the Raritan Bay Loop pipeline and a cathodic protection (CP) power cable. The Raritan Bay Loop consists of 37.55 kilometers (23.33 statute miles) of 0.7-meter (26-inch) -diameter pipeline from the Sayreville shoreline in Middlesex County, New Jersey, to the Rockaway Transfer Point in the Lower New York Bay, New York, south of the Rockaway Peninsula in Queens County, New York. Additionally, a CP power cable would be installed from a rectifier at the existing Transco Morgan meter and regulating (M&R) Station to an offshore anode sled located approximately 366 meters (1,200 feet) north of milepost (MP) 12.32. The approximately 558-meter (1,831-foot) -long power cable would be installed by horizontal directional drill (HDD) at the shoreline at MP12.10. The Raritan Bay Loop would cross a continuous expanse of open marine and estuarine waters in New Jersey and New York, which consists of three major contiguous waterbodies, including Raritan Bay, Lower New York Bay, and the Atlantic Ocean (Figure 1, Figure 2). This area is part of the coastal region known as the New York Bight.

The in-water portion of the Project would occur in waters that support several marine mammal species. The Marine Mammal Protection Act (MMPA) of 1972 prohibits the taking of

marine mammals, which is defined as to "harass, hunt, capture, kill, or attempt to harass, hunt capture or kill," except under certain situations. Section 101(a)(5)(D) allows the issuance of an Incidental Harassment Authorization (IHA) provided that an activity results in small numbers of takes, negligible impacts on marine mammals, and would not adversely affect subsistence use of these animals. The activities associated with the Project (e.g., pile installation and removal) may result in incidental taking by Level A injury and Level B acoustical harassment of marine mammals protected under the MMPA. Transco is submitting an IHA requesting take numbers for ten of the thirteen marine mammal species that may occur in the vicinity of the Project area throughout the year. The remaining three species are unlikely to be found within the acoustic footprint of the Project.

1.2 Project Purpose and Need

Transco proposes to construct, install, and operate the Project facilities to provide 400,000 Dth/d of incremental firm transportation capacity to National Grid to the Rockaway Transfer Point to supply its existing service territory beginning in the 2020 heating season, when the incremental supply would be needed. Transco has executed long-term, fully binding precedent agreements with National Grid for 100% of the Project capacity.

Transco's existing natural gas transportation system currently supplies natural gas to the New York City metropolitan region via National Grid's existing receipt points. Transco's New York Bay Expansion project, which went into service in 2017, provides National Grid with 50,000 Dth/d at the Narrows meter station and 65,000 Dth/d at the Rockaway Transfer Point and satisfied supply needs for the 2017/2018 heating season. However, National Grid is experiencing incremental firm demand and anticipates system growth beyond the 2017/2018 heating season. Therefore, the subsequent incremental supplies needed beginning in the 2020 heating season would be provided through the Northeast Supply Enhancement Project. National Grid commented on the FERC Draft Environmental Impact Statement on May 14, 2018, (Accession Number 20180514-5995) regarding the need for additional gas supply. National Grid stated that, without the incremental capacity from this project, it is possible that it would have to turn away new gas customers at some point in the future.

Legend

- Milepost
- Existing Compressor Station
- Existing Meter & Regulating Station
- Compressor Station 206
- Proposed Pipeline
- Existing Transco Pipeline
- State Boundary
- State/Federal Offshore Line

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Miles

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NOTES

SITE LOCATION

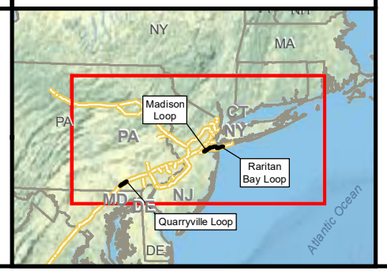

FIGURE 1
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
PROJECT VICINITY
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK, PENNSYLVANIA

Williams

Data Sources: BOEMRE 2010; E&E 2017; ESRI 2012, 2017; U.S. Census Bureau 2016; NYS Office of Information Technology Services GPO 2016; New Jersey Office of GIS 2016; PennDOT 2016; Williams 2017.

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Raritan Bay Loop

MP 24

MP 26

MP 22

MP 18

MP 20

MP 28

MP 30

MP 32

MP 34

MP 35.49

MP 16

MP 14

NEW YORK

NEW JERSEY

State Waters

Federal Waters

Madison Loop

Morgan M&R Station

MP 12

NJ

NY

MP 10

Compressor Station 207

MP 8.57

EAST BANK

Legend

- Milepost
- Existing Compressor Station
- Existing Meter & Regulating Station
- Proposed Pipeline
- Existing Transco Pipeline
- State/Federal Offshore Line
- State Boundary

N

0 1 2

Miles

1:104,000

NOTES

SITE LOCATION

FIGURE 2
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
PROJECT LOCATION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: BOEMRE 2010; E&E 2017; ESRI 2012, 2017; U.S. Census Bureau 2016; NYS Office of Information Technology Services GPO 2016; New Jersey Office of GIS 2016; Williams 2017.

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National Grid considered the physical points that would best serve the projected growth in firm demand and determined that the Rockaway Transfer Point is the only delivery point that could serve this growth. Before it is delivered to National Grid's system, the natural gas from the Project would ultimately flow through the RDL to the meter station at Floyd Bennett Field, allowing National Grid to supply the portion of its system needing incremental volumes in order to meet customer growth. The existing RDL has the flow capacity to handle these additional volumes without modification to facilities or the Form of Service Agreement allowing transportation on the lateral. The Rockaway Transfer Point is the only existing delivery point that can serve the forecasted growth on the National Grid system.

1.3 Project Setting and Location

The Project would include three pipeline loops, two of which are located onshore and one that is located mostly offshore in Raritan Bay, the Lower New York Bay, and the Atlantic Ocean. Table 1 summarizes the proposed Project pipeline facilities within each state, county, and township/borough. Only the Raritan Bay Loop extends offshore; therefore, the other two loops (Quarryville and Madison) are not discussed further.

Table 1
Summary of Pipeline Facilities by State, County, Township/Borough

Facility	County	Township/Borough	Length (statute miles)
Pennsylvania			
Quarryville Loop			
1.1-meter (42-inch) -diameter pipeline (onshore)	Lancaster County	Drumore	4.47
		East Drumore	4.51
		Eden	1.20
		Total	10.17
New Jersey			
Madison Loop			
0.7-meter (26-inch) -diameter pipeline (onshore)	Middlesex County	Old Bridge	1.83
		Sayreville	1.60
		Total	3.43
Raritan Bay Loop			
0.7-meter (26-inch) -diameter pipeline (onshore)	Middlesex County	Sayreville	0.16
0.7-meter (26-inch) -diameter pipeline (offshore)	Middlesex County	Sayreville	0.53
0.7-meter (26-inch) -diameter pipeline (offshore)	Middlesex County	Old Bridge	1.34

Table 1
Summary of Pipeline Facilities by State, County, Township/Borough

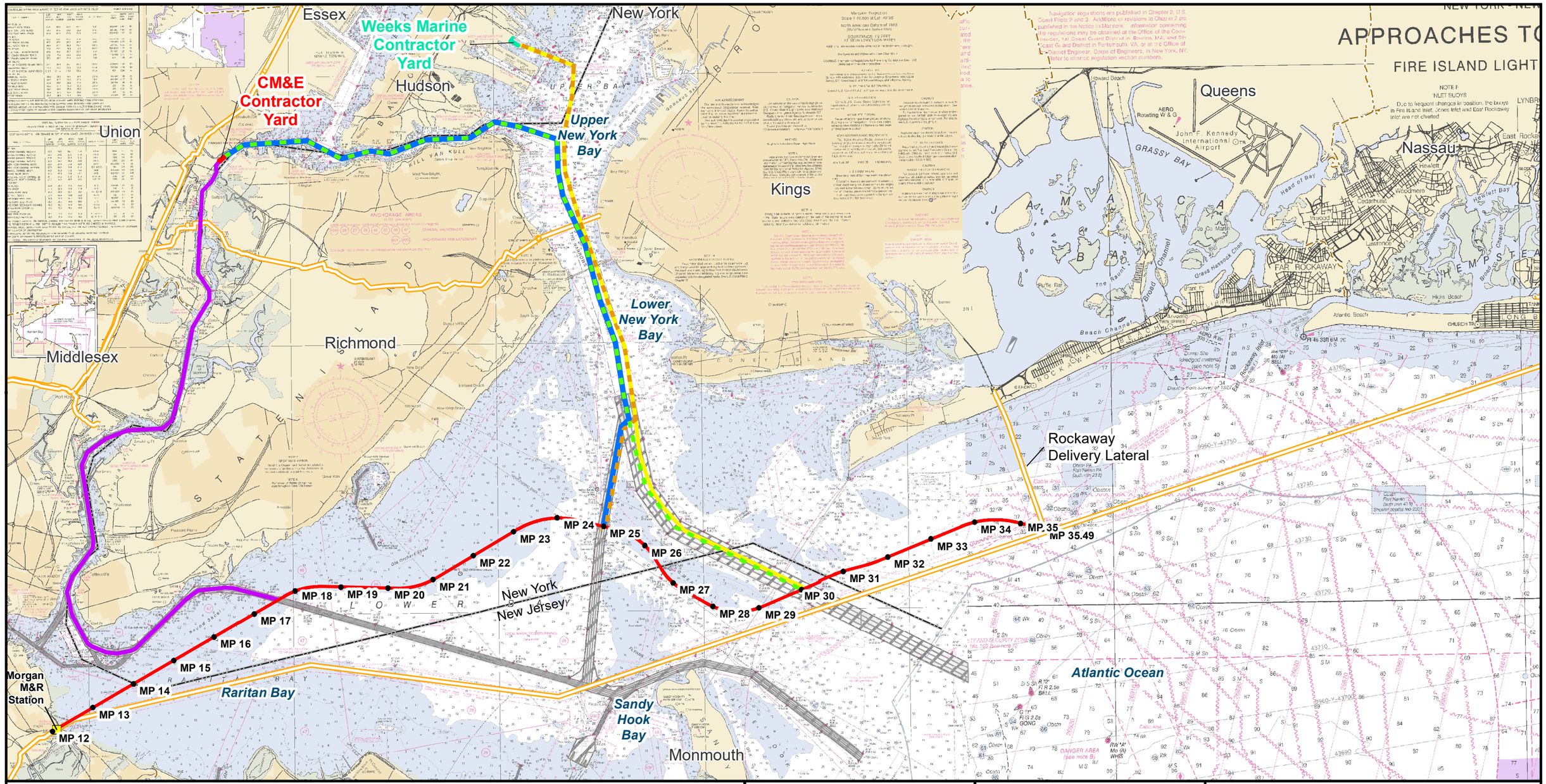
Facility	County	Township/Borough	Length (statute miles)
0.7-meter (26-inch) -diameter pipeline (offshore)	Monmouth County	N/A	4.09
		Total	6.10[a]
New York			
Raritan Bay Loop			
0.7-meter (26-inch) -diameter pipeline (offshore)	Queens County	New York City	6.44
	Richmond County	New York City	10.94
		Total	17.39[a]

Note:
[a] Raritan Bay Loop components within New Jersey do not sum to the accurate total length due to rounding.

Key:
N/A = Not applicable.

As stated above, the Raritan Bay Loop would begin at the onshore connection with the Madison Loop in Middlesex, New Jersey. The offshore portion of the Raritan Bay Loop would extend from the Sayreville shoreline approximately 37.55 kilometers (23.33 statute miles) across Raritan Bay and Lower New York Bay to the Rockaway Transfer Point, which is the interconnection point with the RDL in New York State waters in the Atlantic Ocean, approximately 4.8 kilometers (3 statute miles) seaward of Rockaway, New York. Currently, the RDL subsea manifold is tied into the existing Transco 0.7-meter (26-inch) -diameter LNYBL, which supplies gas through the RDL to an onshore M&R station in Kings County, New York. Approximately 9.58 kilometers (5.95 statute miles) of the offshore portion of the Raritan Bay Loop route cross New Jersey waters, while the remaining 28 kilometers (17.38 statute miles) cross New York waters.

Vessels associated with the Project would travel between the contractor yards in Elizabeth and Jersey City, New Jersey, and the offshore construction workspace. The route the Project vessels would use to reach the offshore workspace would be selected based on the daily work location and sea conditions. The offshore Project area, therefore, is described as the waters between the contractor yards and the construction workspace, as well as the waters of Raritan Bay, Lower New York Bay, and the Atlantic Ocean to approximately 4.8 kilometers (3 statute miles) seaward of Rockaway, New York, where in-water construction would occur. (See Figure 3 for three possible transit pathways to the offshore construction workspace.)



Legend

- Milepost
- Proposed Pipeline
- Approximate Pipeline Shipping Route, Alternative 1
- Approximate Pipeline Shipping Route, Alternative 2
- Approximate Pipeline Shipping Route, Alternative 3
- Approximate Pipeline Shipping Route 4
- Approximate Pipeline Shipping Route 5
- NY/NJ Boundary
- Existing Transco Pipeline
- Maintained Navigation Channel
- CM&E Contractor Yard
- Weeks Marine Contractor Yard

N

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Miles

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NOTES

SITE LOCATION

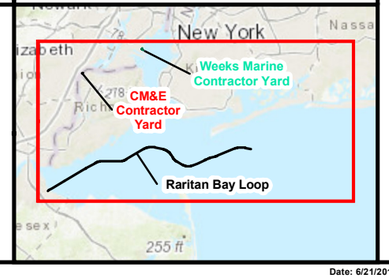

FIGURE 3
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
PROJECT ACTION AREA
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

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1.4 Offshore Pipeline Components

- Morgan Shore Approach: This section of pipe would be installed using the conventional HDD method. A section of pipeline would be pulled through the pre-drilled HDD hole from the subsea exit point (MP12.50) to the onshore HDD entry point (MP12.00) and connected onshore with the proposed Madison Loop.
- Ambrose Channel Crossing: This section of pipe would be installed using the HDD intersect method. A section of pipeline would be pulled from the east pit (MP30.48) through the pre-drilled HDD hole beneath the Ambrose Channel to the HDD west pit (MP29.52).
- Subsea Pipeline – New Jersey: The section of buried offshore pipeline in New Jersey would extend from the Morgan Shore Approach HDD exit pit to where the pipeline crosses into New York waters (MP14.02); from where the pipeline re-enters New Jersey waters (MP26.55) to the west pit of the Ambrose Channel HDD crossing; and from the east pit for the HDD Ambrose Channel crossing to where the pipeline again crosses back into New York waters (MP30.64). These sections of the pipeline would be externally coated with concrete-weight coating (note this process would not occur in water). Transco would then bury the pipe to a minimum depth of 1.22 meters (4 feet) (or equivalent) and in accordance with any permit conditions as directed by the United States Army Corps of Engineers (USACE).
- Subsea Pipeline – New York: The section of buried offshore pipeline in New York would extend from where it enters New York waters (MP14.02) to where it re-enters New Jersey waters at MP26.55; and from where it re-enters New York waters (MP30.64) to the subsea tie-in skid at the Rockaway Transfer Point (MP35.49). These sections of the pipeline would be externally coated with concrete-weight coating (note this process would not occur in water). Transco would bury this section of pipeline to a minimum depth of 1.22 meters (4 feet) (or equivalent) and in accordance with any permit conditions as directed by the USACE.
- Subsea Manifold Tie-in: The Raritan Bay Loop pipeline would be connected to the existing subsea manifold on the RDL via a series of tie-in spools and a tie-in skid.
- Morgan Shore Approach Platform Installation: Transco would install a temporary fixed platform at MP12.50, the Morgan Shore Approach HDD offshore pit in New

Jersey, to support the proposed HDD land-to-water crossing operations. The temporary fixed platform would provide a solid foundation needed to withstand the anticipated pull-in loads of the pipe sections.

1.4.1 Construction Sequence and Schedule

This section provides an overview of the construction sequence for installing the Raritan Bay Loop offshore pipeline components. Transco would complete construction of the various components of the offshore pipeline in several stages with overlapping schedules. These stages and their general sequence are described below.

- Temporary fixed platform: During assembly of the fixed platform, vibratory and impact hammers would be used to install the steel piles; vibratory hammers would be used to remove the piles once the work is completed.

- Pre-trenching, cable crossings, and initial pipelay: Trenching for the offshore (subsea) pipeline would take place using a clamshell dredging device. One clamshell dredge with an environmental bucket and its supporting scows would be mobilized to first excavate a pit and trench at the offshore HDD exit point for the Morgan Shore Approach HDD. Transco would also mobilize a barge equipped with diving, jetting, and material-handling equipment to remove sediment that covers the first Neptune Cable crossing. Transco would then place concrete mattresses on either side of the cable in the excavated areas to create a bridge above the cable. Due to shallow water depths near the Morgan shoreline, a combination of the pipelay barge (Figure 4) and the temporary fixed platform would install pipeline in this section of trench. Following completion of a successful hydrostatic test of the pipeline, a clamshell dredge would backfill the trench. A second clamshell dredge with an environmental bucket would begin trenching the Raritan Bay Channel and the Chapel Hill Channel crossing.

Figure 4 Pipelay Barge and Pipe Transport Barge

- HDD Crossings: For the Morgan Shore Approach HDD, Transco would mobilize a marine-support barge. The clamshell dredge (with environmental bucket) would excavate the exit point and then a vibratory device would be used to install the temporary fixed platform and the piles, known as "goal posts," to guide the pipe at the exit point. Transco would assemble the HDD pipe string on the pipelay barge, a winch wire from the fixed platform would be attached to the HDD pipe string that would pull the pipe string into place with the aid of a tug on the tail end section, lay the pipe string on the seafloor, and then complete a hydrostatic test of the pipeline segment. For the Ambrose Channel crossing, Transco would mobilize a clamshell dredge with an environmental bucket and two liftboats with drilling equipment to the Lower New York Bay. The clamshell dredge would excavate pits at the east point and west point, and then a vibratory device would be used to install piles (goal posts) on opposite sides of the Ambrose Channel. Following the goal post installation, dolphin/fender piles (installed using a vibratory device and/or impact hammer), and a casing would be installed at both HDD pits. The HDD string would then be laid and pulled through.
- Additional Pipelay and Backfill: Following assembly and installation of the Ambrose Channel HDD described above, an anchored pipelay barge would begin laying pipe on the seafloor from the east Ambrose HDD pit to the Rockaway Neptune cable crossing. The anchored pipelay barge would then relocate to west of the Ambrose Channel entry HDD point and lay the pipeline from the west Ambrose HDD pit to the mid-line tie-in point at MP 16.6 . After Transco has laid the pipeline, Transco would use a jet trencher to lower the pipeline and a clamshell dredge would backfill the trench near the Ambrose Channel, Ambrose HDD pits, and navigation channels. Transco would bury the pipe to a minimum depth of 1.22 meters (4 feet) (or equivalent) and in accordance with any permit conditions as directed by the USACE.

- Subsea Manifold Tie-in, Hydrostatic Testing, and Commissioning: Hand jets would be used to expose the existing subsea manifold at the RDL, and a new tie-in valve spool would be installed. A tie-in skid and tie-in spools would be installed at the end of the Raritan Bay Loop. Transco would seal the Raritan Bay Loop pipeline between the onshore entry point and the tie-in skid and pre-commissioning would then occur, which would include hydrostatic pressure testing of the new pipeline. After completion of the hydrostatic test, a final spool piece would be installed to connect the Raritan Bay Loop to the subsea manifold. The tie-in spools between the tie-in skid and tie-in valve spool would be dewatered, the manifold tie-in location would be backfilled, and Transco would introduce natural gas into the completed Raritan Bay Loop.

1.5 Noise-Producing Project Elements.

As presented below, Transco has identified seven distinct construction activities with noise-producing elements. While all of these activities might produce noise, some involve noise that Transco does not expect to take or otherwise impact marine mammals, as explained in the following text.

1. Temporary Fixed Platform Installation and Removal. Transco would install approximately 30 piles using a vibratory device (Figure 5) and/or diesel impact hammer. These piles would be temporary and remain in the water during the course of the Morgan Shore Approach HDD and offshore shallow water pipelay activities (approximately 10 to 12 weeks). Noise would be generated during installation and removal of the piles.

2. Other Pile Installation and Removal. Transco would install approximately 133 temporary piles using a vibratory device and an impact diesel hammer (Figure 5). Noise would be generated during installation and removal of the piles. Eighty-five of these piles are associated with the Ambrose Channel HDD construction activities and would remain in the water only during the course of the HDD offshore construction activities (approximately 5 to 10 weeks). The remaining 48 piles are associated with cable crossings, barge mooring, and other pipelay activities, and they would remain in the water during the course of each construction activity.

Figure 5 Pile Installation Using a Vibratory Device

3. Vessel Operations. Vessels of various sizes, ranging from small day-use workboats to larger supply vessels, pipeline construction vessels, and ocean-going tugboats, would be used throughout the course of the Project. Larger vessels would not use dynamic positioning (DP) due to the relatively shallow depths of the project. Because of the downward force generated by the use of DP on larger vessels, significant sediment disturbance would occur if DP were used. However, smaller support vessels could use DP in the deeper water depths.
4. Clamshell Dredging. A clamshell dredge (Figure 6) with an environmental bucket would be used to excavate the HDD pits, two channel crossings, and the trench between the Morgan Shore HDD and the midline tie-in. Transco does not expect sound to be an issue associated with clamshell dredging because the dredge would be anchored in place and DP would not be used.

Figure 6 Clamshell Dredging

5. Subsea Trenching - Jet Trencher. A majority of the offshore pipeline would be installed using a jet trencher such that the top of the pipeline would be at least 1.22 meters (4 feet) below the seafloor. Similar to the clamshell dredging activities, the major impact during this activity is temporary and localized turbidity. Sound is not a concern for this activity (i.e., noise is not expected to reach Level B thresholds).
6. Hydrostatic Test Water Withdrawal and Discharge. The pipeline would be hydrostatically tested after installation. The major potential impacts associated with this activity would be highly localized changes in water quality and entrainment. Sound is not a concern for this activity.
7. Post-Installation and Final (As-Built) Hydrographic Surveys. The hydrographic survey equipment used for the Project may consist of a magnetometer, side-scan sonar, and/or a sub-bottom profiler. All three types of equipment are considered pulsed noise sources. Both the magnetometer and the side-scan sonar sources operate in very high frequency ranges. The generally preferred operating frequencies for side-scan sonar range from 400 to 900 kilohertz (kHz), with even higher frequencies preferred for ultra-high resolution imagery (McGowen and Morris 2013). In order for marine mammals to respond to a sound source, that sound must be within the audible hearing range of that animal. This means that the frequency and sound pressure level (SPL) of the sound must be within a range

that can be perceived by the animal (Gotz et al. 2009). Therefore, as the operating frequencies of both pieces of equipment are outside of the functional hearing ranges (considered to be under 200 kHz) of the marine mammals expected to be present, the sound associated with the post-installation hydrographic surveys is not of concern for this application. The sub-bottom profiler produces noise in the range of 0.3 kHz to 24 kHz (Crocker and Fratantonio 2016), which may be audible to marine mammals. However, Transco expects that, given the low intensity of this sound source and the narrow bandwidth it produces, acoustic harassment of marine mammals would be avoided.

8. Subsea Trench and HDD Pit Backfill. Backfilling would likely be conducted using a clamshell dredge along the entire offshore route, as required. Supplemental backfill would be used as needed and consist of material from a compatible offshore source approved by the regulatory agencies. The major effect from this activity is a temporary, localized increase in turbidity during sediment release, though backfill material with a high percentage of sand would likely be used, which would limit the extent of the plume. Sound is not a concern for this activity (i.e., noise is not expected to reach Level A or B thresholds).

Only two of the Project's construction elements that are described above involve noise as a concern for local marine mammals for this authorization application: (1) impact and vibratory pile installation and removal associated with the HDD offshore construction and temporary fixed platform, and (2) vessel operations throughout the course of the Project. These two elements are discussed further below.

1.5.1 Pile Installation and Removal

Diesel impact hammers and vibratory devices are commonly used for in-water steel pile installation and removal. Impact pile drivers are piston-type drivers that use various means to lift a piston to a desired height and drop the piston against the head of the pile in order to drive it into the substrate (Caltrans 2015). Impact pile driving is considered an impulsive sound source that generates various levels of underwater noise depending on the size and type of the pile and the type of substrate the pile is driven into. Diesel impact hammers would be used to install approximately 34 steel piles (Table 2).

The vibratory device is considered a continuous low-frequency noise source because the device continuously vibrates the pile into the substrate until the desired depth is reached. A vibratory device uses spinning counterweights, causing the pile to vibrate at a high speed. The vibrating pile causes the soil underneath it to “liquefy” and allow the pile to move easily into or out of the sediment. Vibratory devices generally have source levels 10 to 20 decibels (dB) lower than impact devices, so their use is considered a way to reduce underwater sound when pile driving is necessary for a project and suitable sediment conditions exist (Caltrans 2015). Vibratory devices would be used to install and remove approximately 163 steel pipe piles (Table 2). Note that some piles would require both impact and vibratory installation.

The total time to install a pile is dependent on the installation method (vibratory or impact), diameter of the pile, substrate composition, and depth the pile needs to penetrate through the substrate. For pile installation of 0.9- to 1.5-meter (34- to 60-inch) piles using a diesel impact hammer, the estimated time is 38 to 62 minutes per pile. For pile installation of 0.3- to 1.5-meter (10- to 60-inch) piles using a vibratory hammer, the estimated time is 15 minutes per pile. For pile removal of 0.3- to 1.5-meter (10- to 60-inch) piles using a vibratory hammer, the estimated time is 5 to 30 minutes per pile. The minimum handling time (i.e., periods during which the pile is being positioned, steadied, etc., and no in-water construction noise is anticipated) is dependent on activity type and pile size. For vibratory hammer periods for 0.3- to 1.2-meter (10- to 48-inch) piles, the handling time ranges from 15 to 45 minutes. For vibratory hammer periods for 1.5-meter (60-inch) piles, the minimum handling time is 1 hour and 45 minutes. For impact hammer periods, the minimum handling time is 30 minutes. Pile installation (including both vibratory and impact pile driving) is expected to occur over an estimated 42.5 days. The piles would remain in the offshore environment only for the duration of each related offshore construction activity (see Section 2.2 below for further discussion). Once offshore construction is complete, all piles will be removed using a vibratory hammer, which is expected to occur over an estimated 23 days. Installation and removal of all piles is expected to be completed during summer 2020 (June–August); however, pile removal could shift to fall 2020 (September, October, and/or November), after finalization of the construction schedule. Based on initial acoustic and density modeling, potential impacts to marine mammals associated with pile removal shifting into fall have been addressed (see Section 6.5).

Table 2
Pile Driving Summary for the Raritan Bay Loop[a,b]

Milepost	Site	Pile Type	Purpose	Diameter (in.)	Quantity	Permanent / Temporary	Installation Method	Installation		Removal	
								Driving Time Per Pile[c]	Duration (days)[d]	Removal Time	Duration (days)[d]
12.59	Morgan Shore Approach HDD	Platform Piles (for temporary fixed platform)	Temporary fixed platform for the Morgan Shore Approach HDD in lieu of a jack up barge.	36	18	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I - 52-62 Min / Pile [e]	4.5	30 min/pile	3
12.59	Morgan Shore Approach HDD	Platform Reaction Piles	Provide additional lateral capacity for pipeline pulling winch.	36	4	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I - 52-62 Min / Pile [e]	2	30 min/pile	
12.59	Morgan Shore Approach HDD	Support Barge Fender Piles	To tie up and breast support barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile	2	15 min/pile	
12.59	Morgan Shore Approach HDD	Water Barge Fender Piles	To tie up and breast water barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile		15 min/pile	
12.59	Morgan Shore Approach HDD	HDD String Goal Posts	Support HDD string.	24	10	T	Vibratory Hammer	V-15 Min/Pile	3	5 min/pile	3
13.84	Neptune Power Cable Crossing (MP13.84)	Sleeper Vertical Pile	Provide mechanical protection to ensure there is separation between the Neptune Power cable and the pipeline during shallow water pipe-laying activities.	10	8	T	Vibratory Hammer	V-15 Min/Pile	2	15 min/pile	1.5
14.5 to 16.5	MP14.5 to MP16.5	Morgan Shore Pull Vertical Guide Piles	Ensures pipeline stays within pipeline corridor during surface tow between MP14.5 to MP16.5.	24	22	T	Vibratory Hammer	V-15 Min/Pile	5	15 min/pile	1.5
28.0 to 29.36	MP28.0 to MP29.36	Pipelay Barge Mooring Pile	Assist the pipelay barge with mooring in the vicinity of the Ambrose Shipping Channel.	34	12	T	Vibratory Hammer	V-15 Min/Pile	3	30 min/pile	2
29.4	Ambrose Channel HDD West Side	W750 Side Piles	Landing of small barges/vessels alongside prior to fender piles being installed.	36	3	T	Vibratory Hammer	V-15 Min/Pile	1.5	15 min/pile	0.5
29.4	Ambrose Channel HDD West Side	Reaction Frame Piles	Provide additional lateral capacity for HDD pipeline pull.	36-60	8	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I- 38 Min / Pile [ef]	4	30 min/pile	0.5
29.4	Ambrose Channel HDD West Side	Support Barge Fender Piles	To tie up and breast support barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile	1.5	15 min/pile	1
29.4	Ambrose Channel HDD West Side	Water Barge Fender Piles	To tie up and breast water barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile		15 min/pile	
29.4	Ambrose Channel HDD West Side	HDD String Goal Posts	Support HDD string.	24	12	T	Vibratory Hammer	V-15 Min/Pile	1.5	5 min/pile	2
30.48	Ambrose Channel HDD East Side	Ambrose East Vertical Stabilization Piles	Ensures HDD string is secured while awaiting pullback.	24	22	T	Vibratory Hammer	V -15 Min/Pile	5	15 min/pile	0.5
30.48	Ambrose Channel HDD East Side	W751 Side Piles	Landing of small barges/vessels alongside prior to fender piles being installed.	36	3	T	Vibratory Hammer	V-15 Min/Pile	0.5	15 min/pile	0.5
30.48	Ambrose Channel HDD East Side	Support Barge Fender Piles	To tie up and breast support barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile	1	15 min/pile	1

Table 2
Pile Driving Summary for the Raritan Bay Loop[a,b]

Milepost	Site	Pile Type	Purpose	Diameter (in.)	Quantity	Permanent / Temporary	Installation Method	Installation		Removal	
								Driving Time Per Pile[c]	Duration (days)[d]	Removal Time	Duration (days)[d]
30.48	Ambrose Channel HDD East Side	Water Barge Fender Piles	To tie up and breast water barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile		15 min/pile	
30.48	Ambrose Channel HDD East Side	HDD Drill String Goal Posts	Support HDD string.	24	10	T	Vibratory Hammer	V-15 Min/Pile	1.5	5 min/pile	2
30.48	Ambrose Channel HDD East Side	Pipelay Barge Mooring Pile	Assist the pipelay barge with mooring when recovering the HDD tail string at Ambrose East.	60	1	T	Vibratory Hammer	V-15 Min/Pile[f]	0.5	15 min/pile	1
34.5 to 35.04	MP34.5 to MP35.04	Pipelay Barge Mooring Pile	Assist the pipelay barge with mooring in the vicinity of the Rockaway Manifold.	34	4	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I- 52 Min/ Pile [e]	3	15 min/pile	2
35.04	Neptune Power Cable Crossing (MP35.04)	Crossing Pile	To ensure temporary stability of the pipeline at the crossing location.	10	2	T	Vibratory Hammer	V-15 Min/Pile	1	15 min/pile	1

Notes:
[a] Noise propagation modeling accounts for actual pile-driving and removal durations.
[b] Jack up barge legs, barge spuds, and similar structures are assumed not to be considered piles and are not included in the above quantities.
[c] For vibratory hammer for pile sizes 10 to 48-inches, handling time (no in-water noise production) ranges from 15 to 45 minutes.
[d] Duration (days) includes pile driving/removal as well as additional activities associated with installation/removal.
[e] Assume approximately 30 minutes handling time (no in-water noise production) between each impact hammer duration (unless specified differently in notes).
[f] For vibratory hammer periods for 60-inch piles, the minimum handling time is 1 hour and 45 minutes.

Key:
HDD = horizontal directional drill
in. = inches
I = impact
min = minutes
MP = milepost
T = temporary
V = vibratory

1.5.2 Vessel Operations

Various vessels would be operating within the Project area and transiting between the Project area and shore. The vessel types and positioning methods that would be used throughout the Project are listed in Table 3.

Table 3
Vessel Type and Positioning Method

Activity	Vessel Type	Typical Draft (ft) and Dimensions (LxWxH in feet)	Positioning Method
Excavate HDD pits	Clamshell Dredge[a,b]	9, 200 x 70 x 12	Anchors
Excavate and Backfill Trench (Morgan Shore Approach HDD exit pit to Chapel Hill Channel)	Clamshell Dredge[a,b]	200 x 70 x 12	Anchors
Install/Remove "Goal Post" Piling	Crane Barge[a,b]	8, 250 x 80 x 17	Anchors
Offshore Pipelay (between MP16 and subsea manifold tie-in)	Pipelay Barge[a,b]	10, 350 x 90 x 18 Or 6, 250 x 120 x 16	Anchors with mid-line buoys
Offshore Pipelay (between Morgan Shore Approach HDD exit pit and MP16)	Pipelay Barge[a,b]	6, 2 each, 200 x 50 x 12 Or 6, 250 x 120 x 16	Spuds or anchors
Morgan Shore Approach HDD (pull-back and hydrostatic test of HDD pipe string)	Pipelay Barge[a,b]	6, 2 each, 200 x 50 x 12 Or 6, 250 x 120 x 16	Spuds
	Marine Support Barge[a,b]	6, 300 x 100 x 12	Lift Legs or Spuds
Ambrose Channel HDD Crossing (drilling/reaming, pull-back and hydrostatic test of HDD pipe string)	Pipelay Barge[a,b]	10, 350 x 90 x 16 Or 6, 250 x 120 x 16	Anchors with mid-line buoys
	Liftboats, Jack up[a,b]	10, 190 x 140 x 15	Lift Legs
Transport Pipe/Material	Supply Vessel or Transport Barge[b]	6, 300 x 100 x 12	Rafted beside the barge
Hydrostatic Test HDD Pipe String and Offshore Pipeline	Support Vessel[a,c]	8, 250 x 80 x 17	Anchors with mid-line buoys
Lower and Backfill Pipe with Jet Sled (between Chapel Hill Channel and subsea manifold tie-in)	Crane or Pipelay Barge[a,b]	8, 250 x 80 x 17	Anchors with mid-line buoys
Expose Subsea Infrastructure with Hand-jets (e.g., Neptune Cable and subsea manifold)	Support Vessel	6, 70 x 30 x 15	Anchors with mid-line buoys
Install Subsea Tie-in Skid and Tie-in Spools	Crane Barge[a,b]	8, 250 x 80 x 17	Anchors with mid-line buoys

Table 3
Vessel Type and Positioning Method

Activity	Vessel Type	Typical Draft (ft) and Dimensions (LxWxH in feet)	Positioning Method
Cover Subsea Infrastructure with Protective Mats (e.g., Neptune Cable and subsea manifold)	Crane Barge[a,b]	8, 250 x 80 x 17	Anchors with mid-line buoys
Pre-Commissioning and Commissioning	Support Vessel[a,c]	6, 70 x 30 x 15	Anchors with mid-line buoys

Notes:
[a] Assisted by crew boats
[b] Assisted by tug boats
[c] Subject to change pending confirmation of construction plan.

Typically, DP systems are used for deepwater pipelay operations where conventional positioning of the barge using drop-down anchors and cables becomes impractical. The minimum water depth for a pipelay barge operating with DP is approximately 30.48 meters (100 feet), and the associated barge draft is approximately 9.14 meters (30 feet). The range of water depths for the Project's pipelay operation is approximately 2.13 meters (7 feet) Mean Lower Low Water (MLLW) to 13.10 meters (43 feet) MLLW; therefore, the thrusters on a DP pipelay barge could not operate without excessive turbulence and disturbance of the seabed. Because of the water depths within the Project area, Transco plans to use pipelay barges moored with pre-positioned anchors when installing the offshore sections of the pipeline. Based on the proximity of the Project area to a major shipping center, Transco expects that the background ambient noise is dominated by large vessels (i.e., container ships) and that noise impacts from Project vessels would be comparable to, if not less than, those generated by existing heavy vessel traffic (for further details see Section 1.6.2.). Therefore, Transco does not expect that the vessels associated with the Project would constitute a major noise source of concern relative to the noise from existing vessel traffic in the vicinity of the Project area.

1.6 Sound Levels

1.6.1 Reference Impact and Vibratory Pile Driving Sound Source Levels

This project includes impact and vibratory installation and vibratory removal of 0.25-meter (10-inch), 0.61-meter (24-inch), 0.86-meter (34-inch), 0.91-meter (36-inch), 0.91- to 1.2-meter (36- to 48-inch), and 1.5-meter (60-inch) -diameter steel pipe piles. To estimate the sound levels for installation of these piles, Transco identified source levels for installation and removal of each pile type and size using the compendium compiled by Caltrans (2015). To remain conservative,

the sound source levels used throughout this IHA application were based on the largest pile expected to be driven/removed at each in-water construction site. For example, where Transco has a range of pile sizes (i.e., 0.91 to 1.2 meters [36 to 48 inches]), the largest pile size (1.2 meters [48 inches]) was used in the modeling. The information presented in the compendium is a compilation of SPLs recorded during various in-water pile-driving projects in California, Oregon, Washington, and Nebraska. The compendium is a commonly used reference document for pile-driving source levels when analyzing potential impacts on protected species, including marine mammals, from pile-driving activities. Reference source levels for the Project were determined using data for piles of similar sizes, the same pile-driving method as that proposed for the Project, and at similar water depths. While the pile sizes and water depths chosen as proxies do not exactly match those for the Project, they are the closest matches available, and it is assumed that the source levels shown in Table 4 are the most representative for each pile type and associated pile-driving method.

Table 4
Expected Pile Installation and Removal Source Levels (Average Sound Pressure)

Pile Installation and Removal (near source [10 meters], unattenuated)				
Pile Diameter (in)	**RMS[a] (dB)**		**SEL[b]**	
Installation				
	Impact	**Vibratory**	**Impact**	**Vibratory**
10	-	150	-	150
24	-	160	-	160
34	193	168	183	168
36	193	168	183	168
48	-	170	-	170
60	195	170	185	170
Removal				
	Impact	**Vibratory**	**Impact**	**Vibratory**
10	-	150	-	150
24	-	160	-	160
34	-	168	-	168
36	-	168	-	168
48	-	170	-	170
60	-	170	-	170

Source: Caltrans 2015

Notes:
[a] RMS (root mean square) is the pressure of a sound relative to a reference value.
[b] SEL (sound exposure level) for 1 second of pile driving.

1.6.2 Ambient Noise

Ambient noise is noise that already exists in the environment prior to the introduction of another noise-producing activity. Ambient noise can come from a number of sources, both natural and man-made. Natural sources of ambient noise include biological sources (i.e., various marine species), wind, waves, rain, or naturally occurring seismic activity (i.e., earthquakes) (Richardson et al. 1995). Human-generated sources can include vessel noise (i.e., commercial shipping/container vessels), seismic air guns, and marine construction. Various factors contribute to the ambient noise within the New York Bight region. One of the major contributors to ambient noise is the commercial shipping traffic near the Project area associated with the Port of New York and New Jersey. The Port of New York and New Jersey recorded 4,534 port calls in 2010; it the busiest port on the East Coast and third busiest port in the United States (USDOT Maritime Administration 2011). Based on the proximity of the Project area to this major shipping center, Transco expects that the ambient noise is dominated by large vessels (i.e., container ships) that produce source levels of 180 to 190 dB re 1 micropascal (μPa) RMS at frequencies between 0.2 and 0.5 kHz (Thomsen et al. 2009; Jasny et al. 2005). Underwater noise associated with vessels is attributed to the low-frequency noise created by propeller cavitation. Because propeller use by the larger Project-related vessels would be limited during the construction period, Transco expects that the noise impacts from these vessels would be comparable to, if not less than, those generated by existing heavy vessel traffic in the vicinity of the Port of New Jersey and New York. Therefore, Transco does not expect the vessels associated with the Project to constitute a noise source of concern relative to the noise from existing vessel traffic in the vicinity of the Project area. Therefore, vessel noise is not considered further in this application.

1.6.3 Underwater Transmission Loss

To determine how underwater noise could impact the behavior of protected marine species in the Project area, it is important to understand how sound can spread away from the noise source. As the sound moves away from the source, there is a loss of acoustic intensity with increasing distance from the source. This is known as transmission loss. It is necessary to calculate the transmission loss of a sound source in order to determine how much area around that sound source would encompass the noise threshold criteria. How a sound travels away from a source depends on a variety of factors, including the original source level; environmental factors such as local salinity and temperature; and physical factors such as water depth, currents, and composition of bottom sediments (when depth is a limiting factor). Transmission loss also varies

based on the depth of the sound source and the receiver. Considering all these components can aid in understanding how the sound would travel away from the source.

An important factor in transmission loss is spreading loss (i.e., how the sound spreads out away from the source). There are two types of underwater spreading loss: spherical spreading, where the sound spreads out in spherical waves (6 dB loss per doubling distance), and cylindrical spreading loss, where the sound waves form a cylindrical wave away from the source (3 dB loss per doubling distance). These two types of spreading loss occur under different conditions. Spherical spreading occurs in a uniform medium, whereas cylindrical spreading occurs when the medium is not uniform (Richardson et al. 1995). Due to the complex nature of the marine environment, Transco does not expect the underwater sound would spread in a perfect spherical or cylindrical manner. Therefore, the NOAA National Marine Fisheries Service (NOAA Fisheries Service) recognizes the Practical Spreading Loss model, which accounts for a 4.5 dB loss per doubling distance, as the best method to determine how sound travels away from a source if the site-specific environmental and physical information is not available. The practical spreading loss model was used to determine the approximate straight-line distance (isopleth) from the sound source where the NOAA Fisheries Service Level B threshold criteria are estimated to be reached while driving or removing an individual pile.

Practical Spreading Loss Model:

$$TL = 15 \log (R1/R0)$$

where:

TL = Source Level – Noise Threshold Level

R1 = Range distance the noise criteria extends away from the source (in meters)

R0 = Reference range (i.e., @ 1 meter, @ 10 meters, etc.) (in meters)

1.6.4 In-Air Transmission Loss

To determine how noise could impact the behavior of protected pinnipeds in haul-out areas in the vicinity of the Project area (nearest haul-out is 2.8 kilometers [1.78 statute miles] from Project area), it is important to examine transmission loss of in-air noise in addition to underwater noise. A spherical spreading loss model, which assumes average atmospheric conditions, is a standard model used to estimate transmission loss of in-air noise. Spherical spreading results in a 6 dB decrease in SPL per doubling of distance.

In-Air Spherical Spreading Loss Model:

$$TL = 20 \log (R1/R0)$$

where:

TL = Source Level – Noise Threshold Level

R1 = Range distance the noise criteria extends away from the source (in meters)

R0 = Reference range (i.e., @ 1 meter, @ 10 meters, etc.) (in meters)

1.6.5 Attenuation to NOAA Fisheries Service Thresholds

In-Air Noise

To determine potential impacts on pinnipeds from in-air acoustic noise, the NOAA Fisheries Service has established one harassment threshold for all pinnipeds except harbor seals, 100 dB re 20 μPa, and another harassment threshold for harbor seals, 90 dB re 20 μPa, based on the RMS metric. Based on the source levels noted in Table 5 and initial modeling results, in-air sound levels would not reach the harassment thresholds described above at pinniped haul-out areas.

The modeling used a conservative proxy value for LZFmax acoustic source levels associated with the proposed activities estimated from empirically measured source levels from similar activities (Table 5). LZFmax is used for in-air measurements and is defined as the peak SPL reached. "L" stands for the acoustic sound pressure "level". "Z" refers to the type of weighting function used. In this case, using "Z" indicates that all frequencies are treated equally and no weighting function was applied. "F" is the time weighting function, which dampens sudden changes in sound pressure levels. Lastly, "max" indicates that the maximum value measured over a certain period of time is being displayed. Using the in-air transmission loss model described above, the largest proxy source level of 113 RMS dB re 20 μPa attenuated to 90 dB RMS re 20 μPa within 212 meters (0.13 statute miles).

The closest known haul-out sites for seals in the vicinity of the Project area are located approximately 2.8 kilometers (1.78 statute miles) southwest of the HDD Ambrose West Side Channel site (Sandy Hook) (NYSDEC n.d.[a]) and 16.1 kilometers (10 statute miles) east of the MP14.5 to MP16.5 site (Sandy Hook Beach) (CRESLI n.d.). Modeling in-air noise indicated attenuation to 90 dB RMS re 20 μPa within 212 meters (0.13 statute miles). Consequently, impacts from in-air noise resulting from impact and vibratory pile diving or removal on seals at the haul-out sites is not considered further in this application.

Table 5
Airborne Proxy Measurements Using LZFmax Source Levels Associated with Project Activities

Project and Location	Pile Size, Type	Installation Method	Distance to Pile (meters [feet])	Water Depth (meters [feet])	LZFmax Sound Pressure Levels dB re 20 µPa	90 dB RMS Isopleths (Harbor Seal) (meters[feet])	100 dB RMS Isopleths (Non-harbor seal pinnipeds) (meters[feet])
Waterfront Repairs at USCG Station; Monterey, CA	10-inch steel pile[a]	Vibratory	15 (49.2)	NA	97	34 (111.5)	NA
Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations: JEB Little Creek Naval Station; Norfolk, VA	24-inch steel pile	Vibratory	15 (49.2)	NA	98	38 (124.7)	NA
Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations: Philadelphia Ship Yard; Philadelphia, PA	36-inch steel pile	Vibratory	15 (49.2)	12 (39.4)	98	38 (124.7)	NA
Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations: Philadelphia Ship Yard; Philadelphia, PA	36-inch steel pile	Impact	15 (49.2)	12 (39.4)	113	212 (695.5)	67 (219.8)
Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations: Naval Station Mayport; Jacksonville, FL	48-inch steel pile[b]	Vibratory	15 (49.2)	NA	87	NA	NA
Ebey Slough Bridge Replacement Project; Seattle, WA	60-inch steel pile[c]	Vibratory	10 (32.8)	Shallow	110	100 (328.1)	32 (105.0)
Ebey Slough Bridge Replacement Project; Seattle, WA	60-inch steel pile[c]	Impact	10 (32.8)	Shallow	110	100 (328.1)	32 (105.0)

Source: NAVFAC Atlantic 2017; WSDOT 2011

Notes:
[a] Data insufficient for vibratory airborne measurements for a 10-inch steel pile. Used a conservative measurement collected from an 18-inch pile proxy during vibratory pile driving at USCG Station Monterey, CA.
[b] Data insufficient for vibratory airborne measurements for a 48-inch steel pile. Used measurements collected from 48-inch H pile proxy during vibratory pile driving at Naval Station Mayport; Jacksonville, FL.
[c] Data insufficient for impact and vibratory airborne measurements for a 60-inch steel pile. Used a conservative measurement collected at 10 meters from a single 72-inch pile proxy during impact pile driving in shallow waters in Seattle, WA.

Underwater Noise

NOAA Fisheries Service recognizes two levels of incidental harassment or 'take'. Each level has different thresholds and models to determine potential take. Level A harassment has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Level A Threshold Analysis: NOAA Fisheries Service issued new acoustic guidance in 2016 (updated in 2018) for determining potential impacts on marine mammals, and established new injury thresholds for Level A harassment (NOAA Fisheries Service 2016a; NOAA Fisheries Service 2018f). These criteria differ in several ways from the previously established criteria. First, NOAA Fisheries Service based the criteria on the potential for a sound source to result in permanent threshold shift (PTS). PTS occurs when exposure to noise results in permanent loss of hearing in a portion of the frequency spectrum, which can potentially have direct negative consequences for marine mammals. PTS can result from repeated exposures to reversible threshold shifts, or temporary threshold shift (TTS), or from catastrophic exposure to an intense sound that causes immediate damage to the ear.

Second, the criteria now differentiate between five functional hearing groups and the varied susceptibility of those groups to noise from different portions of the frequency spectrum. Consequently, different thresholds apply to each functional hearing group (see Table 6). The five functional hearing groups are: (1) low-frequency cetaceans (baleen whales), (2) mid-frequency cetaceans (dolphins, toothed whales, beaked whales, and bottlenose whales), (3) high-frequency cetaceans (true porpoises, *Kogia,* river dolphins, cephalorhynchid, *Lagenorhynchus crucige*r and *L. Australis*), (4) phocid pinnipeds (true seals), and (5) otariid pinnipeds (sea lions and fur seals).

Third, NOAA Fisheries Service based the new criteria on different metrics. The criteria use dual metric acoustic thresholds for impulsive sounds (e.g., impact pile driving): peak sound pressure (L_{pk} re 1 μPa) and cumulative sound exposure level (SEL_{cum} re 1 μPa^2s). For non-impulsive sources such as vibratory pile driving, the criteria specify a single cumulative sound exposure level (SEL_{cum} re 1 μPa^2s) for each hearing group. Transco will use the SEL_{cum} impulsive source thresholds for impact pile installation and non-impulsive source thresholds for vibratory pile installation and removal during the analysis for this IHA application. Initial analysis indicated that the SEL_{cum} thresholds would result in larger propagation distances than the L_{pk} thresholds;

therefore, the rest of this analysis will use the $SEL_{cum,}$ as this is the more conservative approach. The NOAA technical guidance calculates isopleths based on the total duration of pile driving/removal within a 24-hour period. The thresholds for Level A impulsive sounds using SEL_{cum} are as follows for a 24-hour period: 183 dB for low-frequency cetaceans, 185 dB for mid-frequency cetaceans, 155 dB for high-frequency cetaceans, 185 dB for phocid pinnipeds, and 203 dB for otariid pinnipeds. The thresholds for Level A non-impulsive continuous sounds using SEL_{cum} are as follows for a 24-hour period: 199 dB for low-frequency cetaceans, 198 dB for mid-frequency cetaceans, 173 dB for high-frequency cetaceans, 201 dB for phocid pinnipeds, and 219 dB for otariid pinnipeds (as no otariid pinnipeds are present [see Section 3], impacts on this hearing group will not be analyzed). Transco used the updated 2018 NOAA technical guidance and calculated the Project isopleth for Level A thresholds based on the expected activity duration in hours within a 24-hour period (modeling cumulative sound). The current NOAA technical guidance is based on cumulative sound exposure in a 24-hour period for each individual animal. This assumes the individual remains stationary within the Project area and is exposed to the same level of sound for 24-hours. It does not account for animal movement out of the Project area. Transco expects any animal exposed during the actual driving/removal event would partially recover during breaks in pile driving and/or leave the Project area. However, Transco has conservatively requested Level A take for select species (see Section 6).

Level B Threshold Analysis: To determine potential behavioral impacts on marine mammals from underwater acoustic sources, NOAA Fisheries Service has established a harassment threshold of 160 dB re1μPa for impulsive sounds and 120 dB re1μPa for non-impulsive sounds, based on the RMS metric. These thresholds determine the zone of influence (ZOI), or the ensonified area, surrounding the acoustic source that exceeds the threshold level. Based on the source levels noted in Table 4, Transco calculated the distance between the threshold and the noise source for the 160 dB and 120 dB thresholds as appropriate for the use of a diesel impact hammer and vibratory device. Transco expects that sound levels capable of resulting in behavioral disturbance from impact pile driving could occur up to 2,154 meters (1.34 statute miles) from the pile installation activity. Sound levels capable of resulting in behavioral disturbance from vibratory pile driving, as modeled, could occur up to 21,544 meters (13 statute miles) from pile installation and removal activities. However, it is highly likely that the noise produced from vibratory activities associated with the Project would be masked by the background noise before reaching the modeled isopleth of 21,544 meters (13 statute miles). As stated in Section 1.6.2, the Port of New York and New Jersey is the busiest port on the East Coast and third busiest port in the U.S. (USDOT Maritime Administration 2011). Based on the proximity of

the Project area to this major shipping center, Transco expects that the ambient noise is dominated by large vessels (i.e., container ships) that produce source levels of 180 to 190 dB re 1 μPa RMS at frequencies between 0.2 and 0.5 kHz (Thomsen et al. 2009; Jasny et al. 2005). However, Transco has conservatively requested Level B take based on the entire modeled Level B ensonified area (see Section 6).

Level A Threshold Analysis: Based on the source levels noted in Table 4 and using an impact hammer and/or vibratory device for pile installation and removal, Transco used formulas in the “Impact Pile Driving” and “Non-Impulse-stationary-continuous” tabs of the Companion User Spreadsheet released by NOAA Fisheries Service to calculate the distances to in-water marine mammal injury thresholds (see Table 6 and Table 7; note that in the Excel spreadsheet ‘impulse’ is short for ‘impulsive’).

Table 6
Calculated Noise Zones for PTS Injury Thresholds (Level A) and Behavioral Thresholds (Level B) Based on Expected Impact and Vibratory Pile Installation Source Levels (average sound pressure)

NOAA Fisheries Service Reference Threshold (SEL_{cum})[a,b]			Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Seals	Behavioral - Cetaceans and Phocids
	Impulsive		183 dB	185 dB	155 dB	185 dB	160 dB
	Non-Impulsive		199 dB	198 dB	173 dB	201 dB	120 dB
Location/Mile Post (MP)	**Pile Size (inches)**	**Hammer Type**	**Level A (Injury) Threshold (meters [feet])[c,d,e]**				**Level B (Behavioral) Threshold (meters [feet])[f]**
HDD Morgan Offshore (MP 12.59)	24	Vibratory	5.9 (19.4)	0.5 (1.6)	8.7 (28.5)	3.6 (11.8)	4,641.6 (15,228.3)
	36[g]	Vibratory	20.0 (65.6)	1.8 (5.9)	29.6 (97.1)	12.2 (40.0)	15,848.9 (51,997.7)
		Impact	4,635.2 (15,207.3)	164.9 (541.0)	5,521.3 (18,114.5)	2,480.6 (8,138.5)	1,584.9 (5,199.8)
	48	Vibratory	27.2 (89.2)	2.4 (7.9)	40.2 (131.9)	16.5 (54.1)	21,544.3 (70,683.4)
Neptune Power Cable Crossing (MP 13.84)	10	Vibratory	1.3 (4.3)	0.1 (0.3)	1.9 (6.2)	0.8 (2.6)	1,000.0 (3,280.8)
MP 14.5 to MP 16.5	24	Vibratory	6.8 (22.3)	0.6 (2.0)	10.1 (33.1)	4.1 (13.5)	4,641.6 (15,228.3)
MP 28.0 to MP 29.36	34	Vibratory	20.0 (65.6)	1.8 (5.9)	29.6 (97.1)	12.2 (40.0)	15,848.9 (51,997.7)
HDD Ambrose West Side (MP 29.4)	24	Vibratory	7.7 (25.3)	0.7 (2.3)	11.3 (37.1)	4.7 (15.4)	4,641.6 (15,228.3)
	36	Vibratory	12.6 (41.3)	1.1 (3.6)	18.6 (61.0)	7.7 (25.3)	15,848.9 (51,997.7)
	48	Vibratory	27.2 (89.2)	2.4 (7.9)	40.2 (131.9)	16.5 (54.1)	21,544.3 (70,683.4)
	60	Vibratory	17.1 (56.1)	1.5 (4.9)	25.3 (83.0)	10.4 (34.1)	21,544.3 (70,683.4)
		Impact	4,855.2 (15,929.1)	172.7 (566.6)	5,783.3 (18,974.1)	2,598.3 (8,524.6)	2,154.4 (7,068.2)
HDD Ambrose East Side (MP 30.48)	24	Vibratory	6.8 (22.3)	0.6 (2.0)	10.1 (33.1)	4.1 (13.5)	4,641.6 (15,228.3)
	36	Vibratory	16.5 (54.1)	1.5 (4.9)	24.4 (80.1)	10.0 (32.8)	15,848.9 (51,997.7)
	48	Vibratory	43.2 (141.7)	3.8 (12.5)	63.8 (209.3)	26.2 (86.0)	21,544.3 (70,683.4)
	60	Vibratory	10.8 (35.4)	1.0 (3.3)	16.0 (52.5)	6.6 (21.7)	21,544.3 (70,683.4)
MP 34.5 to MP 35.04	34	Vibratory	12.6 (41.3)	1.1 (3.6)	18.6 (61.0)	7.7 (25.3)	15,848.9 (51,997.7)
		Impact	2,920.0 (9,580.1)	103.9 (340.9)	3,478.2 (11,411.4)	1,562.7 (5,127.0)	1,584.9 (5,199.8)
Neptune Power Cable Crossing (MP 35.04)	10	Vibratory	0.8 (2.6)	0.1 (0.3)	1.2 (3.9)	0.5 (1.6)	1,000.0 (3,280.8)

Notes:
[a] All in-water behavioral thresholds are re 1 μPa.
[b] All in-water injury thresholds are re 1 μPa^2.
[c] The Level A distance calculated represents the approximate distance the sound would propagate within a 24-hour period.
[d] Calculated values for Level A are cumulative and based on the total number of piles installed per 24-hour period.
[e] Distances to in-water marine mammal injury thresholds criteria were calculated using the “Impact Pile Driving" and "Non-Impulse-stationary-continuous” tab of the Companion User Spreadsheet released in 2018 by NOAA Fisheries Service with the Acoustic Guidance.
[f] Distances to in-water marine mammal behavioral threshold criteria were calculated using the Practical Spreading Loss model.
[g] Multiple distances calculated based on total number of piles expected to be installed/removed per day. The largest calculated distance is represented here.

Table 7
Calculated Noise Zones for PTS Injury Thresholds (Level A) and Behavioral Thresholds (Level B) Based on Vibratory Pile Removal Source Levels (average sound pressure)

NOAA Fisheries Service Reference Threshold (SEL_{cum})[a,b]			Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Seals	Behavioral - Cetaceans and Phocids
	Non-Impulsive		199 dB	198 dB	173 dB	201 dB	120 dB
Location/Mile Post (MP)	**Pile Size (inches)**	**Hammer Type**	**Level A (Injury) Threshold (meters [feet])[c,d,e]**				**Level B (Behavioral) Threshold (meters [feet])[f]**
HDD Morgan Offshore (MP 12.59)	24	Vibratory	2.6 (8.5)	0.2 (0.7)	3.9 (12.8)	1.6 (5.2)	4,641.6 (15,228.3)
	36	Vibratory	50.4 (165.4)	4.5 (14.8)	74.5 (244.4)	30.6 (100.4)	15,848.9 (51,997.7)
	48	Vibratory	22.4 (73.5)	2.0 (6.6)	33.2 (108.9)	13.6 (44.6)	21,544.3 (70,683.4)
Neptune Power Cable Crossing (MP 13.84)	10	Vibratory	1.3 (4.3)	0.1 (0.3)	1.9 (6.2)	0.8 (2.6)	1,000.0 (3,280.8)
MP 14.5 to MP 16.5	24	Vibratory	11.5 (37.7)	1.0 (3.3)	17.0 (55.8)	7.0 (23.0)	4,641.6 (15,228.3)
MP 28.0 to MP 29.36	34	Vibratory	41.6 (136.5)	3.7 (12.1)	61.5 (201.8)	25.3 (83.0)	15,848.9 (51,997.7)
HDD Ambrose West Side (MP 29.4)	24	Vibratory	3.7 (12.1)	0.3 (1.0)	5.5 (18.0)	2.2 (7.2)	4,641.6 (15,228.3)
	36	Vibratory	16.5 (54.1)	1.5 (4.9)	24.4 (80.1)	10.0 (32.8)	15,848.9 (51,997.7)
	48	Vibratory	43.2 (141.7)	3.8 (12.5)	63.8 (209.3)	26.2 (86.0)	21,544.3 (70,683.4)
	60	Vibratory	68.5 (224.7)	6.1 (20.0)	101.3 (332.3)	41.6 (136.5)	21,544.3 (70,683.4)
HDD Ambrose East Side (MP 30.48)	24	Vibratory	18.3 (60.0)	1.6 (5.2)	27.0 (88.6)	11.1 (36.4)	4,641.6 (15,228.3)
	36	Vibratory	16.5 (54.1)	1.5 (4.9)	24.4 (80.1)	10.0 (32.8)	15,848.9 (51,997.7)
	48	Vibratory	43.2 (141.7)	3.8 (12.5)	63.8 (209.3)	26.2 (86.0)	21,544.3 (70,683.4)
	60	Vibratory	10.8 (35.4)	1.0 (3.3)	16.0 (52.5)	6.6 (21.7)	21,544.3 (70,683.4)
MP 34.5 to MP 35.04	34	Vibratory	12.6 (41.3)	1.1 (3.6)	18.6 (61.0)	7.7 (25.3)	15,848.9 (51,997.7)
Neptune Power Cable Crossing (MP 35.04)	10	Vibratory	0.8 (2.6)	0.1 (0.3)	1.2 (3.9)	0.5 (1.6)	1,000.0 (3,280.8)

Notes:

[a] All in-water behavioral thresholds are re 1 μPa.

[b] All in-water injury thresholds are re 1 μPa^2.

[c] The Level A distance calculated represents the approximate distance the sound would propagate within a 24-hour period.

[d] Calculated values for Level A are cumulative and based on the total number of piles installed per 24-hour period.

[e] Distances to in-water marine mammal injury thresholds criteria were calculated using the “Impact Pile Driving" and "Non-Impulse-stationary-continuous” tab of the Companion User Spreadsheet released in 2018 by NOAA Fisheries Service with the Acoustic Guidance.

[f] Distances to in-water marine mammal behavioral threshold criteria were calculated using the Practical Spreading Loss model.

2 DATES, DURATION, AND REGION OF ACTIVITY

The date(s) and duration of each activity and the specific geographical region where it will occur.

2.1 Dates

In-water construction is anticipated to occur between the 2nd quarter of 2020 and the 4th quarter of 2020 (see Table 8 for proposed times frames of individual in-water construction activities). Pile installation and removal activities are currently planned for June-August 2020. Note that timing for pile removal may shift into fall 2020 (see discussion in Section 6.5).

Table 8
Construction and Restoration Schedule

Task	Start Date	Completion Date[a]
New Jersey / New York		
Raritan Bay Loop		
Dredge Trench for Morgan Shore Approach HDD String and Exit Pit MP12.5	Q2 2020	Q3 2020
Lay Morgan Shore Approach HDD String	Q3 2020	Q3 2020
Morgan Shore Approach HDD Crossing (set-up/pile installation, pull through, and hydrostatic test)	Q2 2020	Q3 2020
Neptune Cable Crossing Construction MP13.9	Q2 2020	Q2 2020
Neptune Cable Crossing Construction MP35.2	Q3 2020	Q3 2020
Dredge Ambrose HDD Crossing Entry and Exit Pits	Q2 2020	Q3 2020
Lay Ambrose HDD String	Q3 2020	Q3 2020
Ambrose HDD Crossing (set-up/pile installation, pull through, and hydrostatic test)	Q3 2020	Q3 2020
Pre-lay Trench MP12.5 to MP16.6	Q2 2020	Q3 2020
Dredge and Subsea Tie-In Skid Installation	Q3 2020	Q3 2020
Valve Spool Installation on RDL Manifold	Q3 2020	Q3 2020
Pipe Lay from MP12.5 to MP16.6	Q3 2020	Q3 2020
Post-Pipelay Burial and Backfill from MP12.5 to MP16.6	Q3 2020	Q4 2020
Pipe Lay from Ambrose HDD Entry MP30.4 to MP35.49	Q3 2020	Q3 2020
Pipe Lay from Ambrose HDD Exit MP29.5 to MP16.6	Q3 2020	Q3 2020
Post-Pipelay Burial and Backfill Ambrose HDD Entry MP30.4 to MP35.49	Q3 2020	Q3 2020
Post-Pipelay Burial and Backfill Ambrose HDD Exit MP29.5 to MP16.6	Q3 2020	Q4 2020
Hydrostatic Test and Pre-Commissioning MP12.0 to MP35.49	Q4 2020	Q4 2020
Complete Spool Installation from Subsea Tie-In Skid to RDL at MP35.49	Q3 2020	Q4 2020
Backfill RDL Manifold and Tie-in Skid at MP35.49	Q4 2020	Q4 2020

Note:
[a] Dates are as of January 2019 and are subject to change. Does not include restoration.

Key:
HDD = Horizontal directional drill
MP = Milepost
Q = Yearly quarter

2.2 Duration

The Project would include the installation and removal of 163 piles. The duration of installation and removal for each pile type and location is shown in Table 9. Transco conservatively estimates a total of 4,321 minutes (72 hours) for pile installation, of which 1,875 minutes (31 hours) is impact pile driving and 2,445 minutes (41 hours) is vibratory pile driving. For vibratory pile removal, Transco estimates 2,755 minutes (46 hours). The goal posts and fender piles would remain in the offshore environment only for the duration of the HDD portion of offshore construction (approximately 10 to 12 weeks throughout the HDD activities). The temporary fixed-platform piles would remain in the offshore environment only for the duration of the shallow pipelay activities (approximately 10 to 12 weeks). All other piles would remain in the offshore environment only for the duration of each related construction activity (approximately 5 to 10 weeks).

2.3 Region of Activity

The offshore portion of the Project would be located in the waters of Raritan Bay, the Lower New York Bay, and the Atlantic Ocean (see Figures 1 and 2). The Project area is located in the greater New York Bight region. The New York Bight is a triangular-shaped area of the continental shelf generally bounded by Montauk Point on eastern Long Island, Cape May in southern New Jersey, and the open shallows of the Atlantic Ocean. The depth of water in the area averages about 27 meters (90 feet), except in the northwest-southeast–trending Hudson Canyon, which has depths in excess of 73 meters (240 feet) (Ketchem et al. 1951). The New York Bight, as described by Stoffer and Messina (1996), refers to the bend, or curve, in the shoreline of the open coast and great expanse of shallow ocean between Long Island and the New Jersey coast. Water depths exceed 30 meters (100 feet) approximately 80 kilometers (50 statute miles) offshore. No significant features existing within the Project area suggest that the habitat within the Project area is unique in relation to the greater expanse that defines the Bight.

Prominent ocean currents occur within the region of the New York Bight. Prevailing wave energy forces sand movement westward along the southern shore of Long Island (Tanski 2007). Longshore currents near the Atlantic shoreline of the Rockaway Peninsula interact substantially with the Hudson-Raritan estuary, particularly along the Ambrose Channel entering New York Harbor (Bruno and Blumberg 2009). Ocean currents near the Project area extend farther offshore and flow to the south, driven by the Hudson-Raritan plume. This brackish plume is prevalent during seasonal periods of peak river discharge and enters the ocean at the opening between Rockaway Point and Sandy Hook, New Jersey (Young and Hillard 1984). Local circulation

patterns can run counter to this southerly current and cause it to slow down and reverse direction. Bottom substrate throughout the New York Bight and the Project area is generally sand (USGS and The Nature Conservancy 2010).

Table 9
Estimated Cumulative Pile Installation and Removal by Pile Diameter and Site Location

Site Location and Diameter Pile (inches)	Total Quantity (ea.)	Method	Minimum Handling Duration per Pile (min.)	Duration per pile (min.)	Estimated Piles per Day	Strikes per Pile	Estimated Total Number of Days	Duration Used in Model (hours [vibratory] or piles per day [impact])
Pile Installation								
Neptune Power Cable Crossing (MP35.04), 10-inch Piles	2	Vibratory	45	15	2	NA	1	0.50
Neptune Power Cable Crossing (MP13.84), 10-inch Piles	8	Vibratory	45	15	4	NA	2	1
HDD Morgan Offshore, 24-inch Piles	10	Vibratory	45	15	4	NA	3	1
MP14.5 to MP16.5, 24-inch Piles	22	Vibratory	45	15	5	NA	5	1.25
HDD Ambrose West Side, 24-inch Piles	12	Vibratory	45	15	6	NA	1.5	1.5
HDD Ambrose East Side, 24-inch Piles	22	Vibratory	45	15	5	NA	5	1.25
HDD Ambrose East Side, 24-inch Piles	10	Vibratory	45	15	5	NA	1.5	1.25
MP28.0 to MP29.36, 34-inch Piles	12	Vibratory	45	15	4	NA	3	1
MP34.5 to MP35.04, 34-inch Piles	4	Vibratory	45	15	2	NA	3	0.5
		Impact		52		1,920 – 2,500		2 piles per day
HDD Ambrose West Side, 36-inch Piles	3	Vibratory	45	15	2	NA	1.5	0.5
HDD Ambrose East Side, 36-inch Piles	3	Vibratory	45	15	3	NA	0.5	0.75
HDD Morgan Offshore, 36-inch Piles	18	Vibratory	45	15	4	NA	4.5	1
		Impact		52 - 62		1,920 – 2,500		4 piles per day
HDD Morgan Offshore, 36-inch Piles	4	Vibratory	45	15	2	NA	2	0.5
		Impact		52 - 62		1,920 – 2,500		2 piles per day

Table 9
Estimated Cumulative Pile Installation and Removal by Pile Diameter and Site Location

Site Location and Diameter Pile (inches)	Total Quantity (ea.)	Method	Minimum Handling Duration per Pile (min.)	Duration per pile (min.)	Estimated Piles per Day	Strikes per Pile	Estimated Total Number of Days	Duration Used in Model (hours [vibratory] or piles per day [impact])
HDD Morgan Offshore, 36- to 48-inch Piles	8	Vibratory	45	15	4	NA	2	1
HDD Ambrose West Side, 36- to 48-inch Piles	8	Vibratory	45	15	4	NA	1.5	1
HDD Ambrose East Side, 36- to 48-inch Piles	8	Vibratory	45	15	8	NA	1	2
HDD Ambrose West Side, 36- to 60-inch Piles	8	Vibratory	45 - 105	15	2	NA	4	0.5
		Impact		38		3,382		2 piles per day
HDD Ambrose East Side, 60-inch Pile	1	Vibratory	45 - 105	15	1	NA	0.5	0.25
Pile Removal								
Neptune Power Cable Crossing (MP35.04) 10-inch Piles	2	Vibratory	15	15	2	NA	1	0.5
Neptune Power Cable Crossing (MP13.84) 10-inch Piles	8	Vibratory	15	15	4	NA	1.5	1
HDD Morgan Offshore, 24-inch Piles	10	Vibratory	15	5	4	NA	3	0.3
MP14.5 to MP16.5, 24-inch Piles	22	Vibratory	15	15	11	NA	1.5	2.75
HDD Ambrose West Side 24-inch Piles	12	Vibratory	15	5	6	NA	2	0.5
HDD Ambrose East Side, 24-inch Piles	22	Vibratory	15	15	22	NA	0.5	5.5
HDD Ambrose East Side, 24-inch Piles	10	Vibratory	15	5	5	NA	2	0.5

Table 9
Estimated Cumulative Pile Installation and Removal by Pile Diameter and Site Location

Site Location and Diameter Pile (inches)	Total Quantity (ea.)	Method	Minimum Handling Duration per Pile (min.)	Duration per pile (min.)	Estimated Piles per Day	Strikes per Pile	Estimated Total Number of Days	Duration Used in Model (hours [vibratory] or piles per day [impact])
MP28.0 to MP29.36, 34-inch Piles	12	Vibratory	15	30	6	NA	2	3
MP34.5 to MP35.04, 34-inch Piles	4	Vibratory	15	15	2	NA	2	0.5
HDD Ambrose West Side, 36-inch Piles	3	Vibratory	45	15	3	NA	0.5	0.75
HDD Ambrose East Side, 36-inch Piles	3	Vibratory	45	15	3	NA	0.5	0.75
HDD Morgan Offshore, 36-inch Piles	22	Vibratory	45	30	8	NA	3	4
HDD Morgan Offshore, 36- to 48-inch Piles	8	Vibratory	45	15	3	NA	3	0.75
HDD Ambrose West Side, 36- to 48-inch Piles	8	Vibratory	45	15	8	NA	1	2
HDD Ambrose East Side, 36- to 48-inch Piles	8	Vibratory	45	15	8	NA	1	2
HDD Ambrose West Side, 36- to 60-inch Piles	8	Vibratory	45	30	8	NA	0.5	4
HDD Ambrose East Side, 60-inch Piles	1	Vibratory	45	15	1	NA	1	0.25

Key:
ea. = each
min. = minutes
NA = Not applicable

3 SPECIES AND NUMBERS OF MARINE MAMMALS AND AFFECTED SPECIES STATUS AND DISTRIBUTION

The species and numbers of marine mammals likely to be found in the activity area, and a description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

Because of the number of marine mammals discussed, Section 3 has been combined with Section 4 so that all species-specific information can be provided together for ease of review. Each topic required in Section 4 (status, distribution, and seasonal distribution [when applicable]) is identified and addressed under subheadings in Section 3.

3.1 Species Present

Thirteen species of marine mammals are found in the New York Bight south of Long Island, New York (Table 10) (Hayes et al. 2018a; Hayes et al. 2018b; NOAA Fisheries Service 2018e. All species may be present in the area throughout the year; however, because these species prefer different habitat and some species migrate seasonally, it is unlikely that all species would be present during every season of in-water construction or in the vicinity of the Project area throughout the duration of the Project.

Table 10
Marine Mammal Species Potentially in the Region of the New York Bight

Common Name	Scientific Name	Endangered Species Act Status	Marine Mammal Protection Act Status	Time of Year Expected in Northeast Region	Presence in Project Area
Pinnipeds					
Gray Seal (Western North Atlantic Stock)	*Halichoerus grypus atlantica*	None	Non- strategic	September-May	Possible
Harbor Seal (Western North Atlantic Stock)	*Phoca vitulina concolor*	None	Non-strategic	September-May	Possible
Harp Seal (Western North Atlantic Stock)	*Pagophilus groenlandicus*	None	Non-strategic	January-May	Uncommon
Cetaceans					
Whales					
Fin Whale (Western North Atlantic Stock)	*Balaenoptera physalus*	Endangered	Depleted, Strategic	Year-round	Possible
Humpback Whale (Gulf of Maine Stock)	*Megaptera novaeangliae*	None	Non-depleted, Non-strategic	Year-round	Possible

Table 10
Marine Mammal Species Potentially in the Region of the New York Bight

Common Name	Scientific Name	Endangered Species Act Status	Marine Mammal Protection Act Status	Time of Year Expected in Northeast Region	Presence in Project Area
Minke Whale (Canadian East Coast Stock)	*Balaenoptera acutorostrata acutorostrata*	None	Non-strategic	Spring/Summer/Fall	Possible
North Atlantic Right Whale (Western North Atlantic Stock)	*Eubalaena glacialis*	Endangered	Depleted, Strategic	November-April	Possible
Dolphins and Porpoises					
Atlantic White-Sided Dolphin (Western North Atlantic Stock)	*Lagenorhynchus acutus*	None	Non-strategic	Year-round	Uncommon
Common Bottlenose Dolphin (Western North Atlantic Offshore Stock)	*Tursiops truncatus truncatus*	None	Non-strategic	June-August	Possible
Common Bottlenose Dolphin (Western North Atlantic Northern Migratory Coastal Stock)	*Tursiops truncatus truncatus*	None	Depleted, Strategic	June-August	Possible
Harbor Porpoise (Gulf of Maine/Bay of Fundy Stock)	*Phocoena phocoena*	None	Non-strategic	November-May	Possible
Common Dolphin (Western North Atlantic Stock)	*Delphinus delphis delphis*	None	Non-strategic	Mid-January-May	Possible
Long-Finned Pilot Whale (Western North Atlantic Stock)	*Globicephala melas*	None	Non-strategic	June-August	Uncommon
Short-Finned Pilot Whale (Western North Atlantic Stock)	*Globicephala macrorhynchus*	None	Non-strategic	June-August	Uncommon
Source: Hayes et al. 2018a; Hayes et al. 2018b; NOAA Fisheries Service 2018e					

3.2 Pinnipeds

Three species of pinnipeds occur in the Atlantic Ocean south of Long Island, New York: the gray seal (*Halichoerus grypus atlantica*), harbor seal (*Phoca vitulina concolor*), and harp seal (*Pagophilus groenlandicus*). All three pinniped species are most likely to occur in the region during winter and early spring (September–May).

3.2.1 Gray Seal

Gray seals are members of the true seal family (Phocidae). Adult gray seals are sexually dimorphic, with males generally being larger than females. Adult males can reach up to 3 meters (10 feet) in length and weigh up to 400 kilograms (880 pounds) (NOAA Fisheries Service 2015a). Adult females can reach up to 2.3 meters (7.5 feet) in length and weigh up to 250 kilograms (550 pounds) (NOAA Fisheries Service 2015a). This species, like other members of the Phocidae family, lacks external ear flaps, and the rear flippers do not rotate. Gray seal appearance and coloration depends on their geographic location and differs between sexes. In general, adult females have a silver-grey coat with darker spots scattered over their body. Males can have similar color pattern, but they have a prominent, long-arched nose (NOAA Fisheries Service 2015a).

Gray seals are opportunistic predators that feed primarily on various species of crustaceans, squid, fish, and octopus (NOAA Fisheries Service 2015a). They consume between 4% and 6% of their body weight each day, hunting throughout the entire water column for prey. They often co-occur with harbor seals because their habitat and feeding preferences overlap (NOAA Fisheries Service 2015a). They primarily inhabit coastal waters. However, they do venture into deeper water, as they have been known to dive up to 475 meters (1,560 feet) to capture prey during feeding (NOAA Fisheries Service 2015a).

Gray seals, along with 40 other pinniped species and subspecies, are capable of hearing in both air and water. In general, the estimated bandwidth for functional hearing for pinnipeds in water is 75 (Hz) to 75 kHz, and in air is 75 Hz to 30 kHz (Southall et al. 2007). Pinnipeds can produce a wide variety of low-frequency social sounds and have distinctly different hearing capabilities in air and water (Southall et al. 2007). Direct testing of hearing capabilities in water have been conducted on a variety of pinniped species, including both behavioral reactions to sounds and direct measurements of hearing through auditory evoked potential (AEP) methods (Southall et al. 2007; Finneran 2016).

3.2.1.1 Numbers

Current population estimates of the Western North Atlantic gray seal are not available; however, estimates for portions of the total population are available for certain time periods (Hayes et al. 2018b). For instance, in 2016, the best Canadian gray seal population estimate was 424,300 individuals (Hayes et al. 2018b). The population within U.S. waters is estimated to be 27,131 (coefficient of variation [CV] = 0.19), derived from models using the total population size to pup ratios in Canada applied to U.S. pup count surveys.

Gray seals in the U.S. are known to pup at four separate locations: (1) Muskeget Island, Massachusetts, (2) Monomoy Island, Massachusetts, (3) Green Island, Maine, and (4) Seal Island, Maine. While pups have stranded on eastern Long Island beaches in New York, no pupping colonies are expected to occur in the Project area. Populations are likely increasing based on aerial survey data collected from the pupping sites; however, the rate of increase is unknown (Hayes et al. 2018b). In addition to natural increases, the population increase of gray seals in the U.S. may partially be due to immigration of individuals from Canadian populations (Hayes et al. 2018b).

3.2.1.2 Status

Gray seals are not categorized as depleted or strategic under the MMPA, are not listed as threatened or endangered under the Endangered Species Act (ESA), and are not state-listed in New York or New Jersey. The current status of the Western North Atlantic gray seal stock, relative to the optimum sustainable population (OSP) level, in the U.S. Atlantic exclusive economic zone (EEZ) is unknown; however, the stock population is increasing in both Canadian and U.S. waters (Hayes et al. 2018b). Populations may be increasing specifically in New York waters given increased numbers of stranded animals and increases in observations during aerial, ship, and land-based surveys (DiGiovanni et al. 2015). Although numbers may be increasing, the conservative assumptions of the take estimation (including the assumption that all gray seals are in the water at all times) should account for the possibility of increased numbers of gray seals since the most recent population estimate.

3.2.1.3 Distribution

The gray seal occurs on both sides of the North Atlantic, divided into three primary populations: (1) eastern Canada, (2) northwestern Europe, and (3) the Baltic Sea (Katona et al. 1993). The U.S. Western North Atlantic Stock of gray seals is part of the eastern Canada population (Hayes et al. 2018b). In U.S. waters, gray seals can be found year-round in the coastal waters of the Gulf of Maine, and year-round breeding of approximately 400 animals has been documented on areas of outer Cape Cod and Muskeget Island in Massachusetts (Hayes et al. 2018b). Hayes et al. (2018b) reports that gray seals are potentially present in the Project area from September to May. The closest known haul-out sites for gray seals in the vicinity of the Project area are located 2.86 kilometers (1.78 statute miles) southwest of the Ambrose Channel Crossing site (Sandy Hook Beach) and 16.1 kilometers (10 statute miles) east of the MP14.5 to MP16.5 site (Sandy Hook Beach). Additional haul-out sites are likely Little Gull Island in the Long Island Sound (CRESLI n.d.). Gray seals were initially observed on Great Gull Island in eastern

Long Island Sound in 2005 and since that time 29 gray seals from Great Gull Island moved to Little Gull Island just to the east (DiGiovanni et al. 2015). DiGiovanni et al. (2015) reported that aerial surveys in March 2014 resulted in a count of 538 gray seals on Little Gull Island.

Gray seals have stranded along the New York and New Jersey coasts in recent years. Between 2011 and 2015, 67 gray seals stranded (mortalities) in New York and 35 stranded (mortalities) in New Jersey (Hayes et al. 2018b). During 2013, 35 gray seals stranded (mortalities and living animals) along the Long Island coast (RFMRP 2014). Of those strandings, all occurred between January and June. These data, however, do not specify if those strandings in New York waters were along the southern coast of Long Island or within Long Island Sound. In July 2018, NOAA Fisheries Service declared an Unusual Mortality Event (UME) for gray seals along the Atlantic coast due to infectious disease (1,422 stranded individuals [both harbor and gray seals] as of December 21, 2018) (NOAA Fisheries Service 2018d). The Riverhead Foundation for Marine Research and Preservation (RFMRP) reported approximately 30 gray seal strandings in New York state waters, and the Marine Mammal Stranding Center (MMSC) reported 64 strandings in New Jersey state waters in 2018 (RFMRP 2018; MMSC 2018). Gray seals may be found in the Project area during winter, spring, and early summer, based on known occurrence information, sighting data, and their known range.

3.2.2 Harbor Seal

Harbor seals also are members of the true seal family (Phocidae). Adult harbor seals, like gray seals, are sexually dimorphic, with males generally being larger than females. Adult harbor seals can reach up to 1.7 meters to 1.9 meters (5.6 feet to 6.3 feet) in length and weigh up to 110 kilograms (245 pounds) (NOAA Fisheries Service 2015b). This species, like other members of the Phocidae family, lacks external ear flaps and the rear flippers do not rotate. Harbor seal coloration varies, but they commonly have a blue-gray color on their back with a speckling of both light and darker colors. When hauled-out, they can be identified by their concave, dog-like snout and their “banana-like” position (characteristic resting pose with raised head and tail) (NOAA Fisheries Service 2015b).

Harbor seals are opportunistic hunters that feed on squid and schooling fish such as herring, alewife, flounder, cod, and hake. Much of their daily activity involves actively foraging in the water column and seabed (Reeves et al. 2002a). Their diving activities (assumed for foraging), are related to risk-reward models, where increased diving activity increases their overall likelihood of predator-related mortality (i.e., shark attacks); as a result, harbor seals experience relatively high mortality from predators. At Sable Island, Nova Scotia, shark-related mortality was

as high as 45% for harbor seal pups in 1996 (Lucas and Stobo 2000). Haul-out sites effectively reduce predation by decreasing the total amount of time spent in the water and, therefore, the overall likelihood of predation by marine predators.

Harbor seals (similar to gray seals) are capable of hearing in both air and water. In general, the estimated bandwidth for functional hearing for pinnipeds in water is 75 Hz to 75 kHz, and in air is 75 Hz to 30 kHz (Southall et al. 2007).

3.2.2.1 Numbers

Harbor seals are the most common seal species in New York State (NYSDEC n.d.[b]); therefore, the harbor seal is expected to be the most prevalent pinniped both within and near the vicinity of the Project area, though occurrence in the area is generally limited to September through May. The best current abundance estimate of the Western North Atlantic stock of harbor seals is 75,834 (CV=0.15), which is based on a 2012 survey (Hayes et al. 2018b). The 2012 survey was designed to sample bay units using a single aircraft; it also included a radio-tracking aircraft and used a correction factor. The 2012 corrected estimate was 24% lower than the 2001 estimate. Although the 2012 population estimate was lower than the 2001 estimate, Hayes et al. (2018b) do not consider the population to be declining because the two estimates are not significantly different and because the 2012 estimate was lower due to a fraction of the population not being in the survey area.

3.2.2.2 Status

Harbor seals are not categorized as depleted or strategic under the MMPA, are not listed as threatened or endangered under the ESA, and are not state-listed in New York or New Jersey. The current status of the western North Atlantic harbor seal stock, relative to the OSP level, in the U.S. Atlantic EEZ is unknown (Hayes et al. 2018b). Populations may be increasing specifically in New York waters given increased numbers of stranded animals and increases in observations during aerial, ship, and land-based surveys (DiGiovanni et al. 2015). Although numbers may be increasing, the conservative assumptions of the take estimation (including the assumption that all harbor seals are in the water at all times) should account for the possibility of increased numbers of harbor seals since the most recent population estimate.

3.2.2.3 Distribution

Harbor seals can occur in all nearshore waters of the North Atlantic above 30°N (Burns 2009). The range of the Western North Atlantic stock of harbor seals includes the Project area. Studies of harbor seals' mitochondrial DNA suggests that female harbor seals are regionally

philopatric (tend to return to or remain near a particular site or area); therefore, population and/or management units are on the scale of a few hundred kilometers (Stanley et al. 1996). Despite a lack of understanding of the western North Atlantic population stock structure, studies suggest that all harbor seals along the eastern coasts of the U.S. and Canada represent a single population (Temte et al. 1991; Hayes et al. 2018b).

The western North Atlantic stock of harbor seals is primarily found along the coastal and inshore regions of the northeastern U.S. and Canada, with the greatest concentrations occurring in coastal Maine, where they reproduce and reside year-round (Katona et al. 1993; Hayes et al. 2018b). In the western North Atlantic, the harbor seal ranges from the eastern Canadian Arctic and Greenland south to the southern extent of New England and New York State and, on rare occasions, the Carolinas (Mansfield 1967; Baird 2001). Their presence in the region of the Project area is seasonal, with increasing numbers from October to March and a peak in mid-March (Hoover et al. 2013), when adults, sub-adults, and juveniles are expected to migrate south from Maine (in late summer/early fall). They return north to the coastal waters of Maine and Canada in late spring (Katona et al. 1993).

Pupping season generally occurs from mid-May through June, primarily along the Maine coast (Richardson 1976; Temte et al. 1991) and, to a much lesser extent, anecdotally at high-use haul-out sites off of Manomet, Massachusetts (Hayes et al. 2018b). The closest known haul-out sites for harbor seals in the vicinity of the Project area are located 2.86 kilometers (1.78 statute miles) southwest of the Ambrose Channel Crossing site (Sandy Hook Beach) and 16.1 kilometers (10 statute miles) east of the MP14.5 to MP16.5 site (Sandy Hook Beach), with additional haul-out sites along the neighboring islands to the north (CRESLI n.d.; NYSDEC n.d.[b]). The Coastal Research and Education Society of Long Island (CRESLI) Seal Research Program has monitored seal populations for over 15 years and continues to conduct behavioral and population studies of seals around Long Island, including regular observations at a major haul-out site at Cupsogue Beach Park. Cupsogue Beach Park is located approximately 96.6 kilometers (60 statute miles) north of the Project area on the eastern shore of Long Island, New York. There are approximately 26 haul-out locations around Long Island, and CRESLI has documented a total of 18,321 harbor seals during 334 surveys since 2004 (CRESLI 2019).

Harbor seals have stranded along the New York and New Jersey coasts in recent years. Between 2011 and 2015, 76 harbor seals stranded (mortalities) in New York and 32 stranded (mortalities) in New Jersey (Hayes et al. 2018b). During 2013, 16 harbor seal strandings (mortalities and alive) occurred along the Long Island coast (RFMRP 2014). Of those strandings,

all but two occurred between January and May; the remaining two strandings occurred in December and June. These data, however, do not specify whether the strandings in New York waters were along the southern coast of Long Island or within Long Island Sound. In July 2018, NOAA Fisheries Service declared an UME for harbor seals along the Atlantic coast due to infectious disease (1,422 stranded individuals [both harbor and gray seals] as of December 21, 2018) (NOAA Fisheries Service 2018d). The RFMRP reported approximately two harbor seal strandings in New York state waters, and the MMSC reported 25 strandings in New Jersey state waters in 2018 (RFMRP 2018; MMSC 2018). Harbor seals may be found in the Project area during winter, spring, and early summer, based on known occurrence information, sighting data, and their known range.

3.2.3 Harp Seal

Harp seals are members of the true seal family (Phocidae). Adult harp seals reach between 1.5 meters to 1.8 meters (5 feet to 6 feet) in length, and can weigh approximately 135 kilograms (300 pounds). This species, like other members of the Phocidae family, lacks external ear flaps and has rear flippers that do not rotate. Harp seals have light gray fur on their body, with the exception of their face, and a black saddle-shaped patch on their dorsal side (NOAA Fisheries Service 2015c). Harp seals feed on many types of fish and invertebrates and are only limited divers (NOAA Fisheries Service 2015c). Particular species they forage on include arctic and polar cod, capelin, and krill (NOAA Fisheries Service 2015c).

As with gray and harbor seals, harp seals are capable of hearing in both air and water. In general, the estimated bandwidth for functional hearing for pinnipeds in water is 75 Hz to 75 kHz, and in air is 75 Hz to 30 kHz (Southall et al. 2007).

Harp seals in the North Atlantic and Arctic Oceans are considered to comprise three populations associated with the specific pack ice sites where pupping occurs (Hayes et al. 2018b). In the U.S., one stock, the Western North Atlantic Stock, is recognized and is comprised of the harp seals that breed off the coasts of Newfoundland and Labrador (Front Herd) and those that breed near the Magdalen Islands in the Gulf of St. Lawrence (Gulf Herd) (Hayes et al. 2018b). There is also a population that breeds off the West Ice near eastern Greenland and one that breeds on the ice in Russia's White Sea (Hayes et al. 2018b).

3.2.3.1 Numbers

Current population estimates for harp seals are developed based on a variety of methods, including aerial surveys and mark-recapture studies of whelping concentration areas. Population

estimates are determined based on adult numbers and pup production at these whelping areas. In 2012, The Western Northern Atlantic stock of harp seals was estimated to be 7,445,000 and projected to be 7,411,000 in 2014, with the best estimate being 7,400,000 individuals (Hayes et al. 2018b). The population appears to be relatively stable (Hayes et al. 2018b).

3.2.3.2 Status

Harp seals are not considered depleted or strategic under the MMPA, are not listed as threatened or endangered under the ESA, and are not state-listed in New York or New Jersey. The status of the stock in U.S. waters in relation to its OSP level is unknown (Hayes et al. 2018b).

3.2.3.3 Distribution

Harp seals occur throughout the North Atlantic and Arctic Oceans (Hayes et al. 2018b). Harp seals from the Western North Atlantic stock begin their migration south toward U.S. waters following summer feeding in the more northern Canadian waters. During this southerly migration, adults and some immature harp seals reach the Gulf of St. Lawrence in the winter, with some continuing into U.S. waters during winter and spring. The most southerly point of migration for this species has been New Jersey, from January through May (Harris et al. 2002; Hayes et al. 2018b). Sightings of harp seals this far south have been increasing since the early 1990s. This southward shift in harp seal migration may be due to changing environmental conditions (Lacoste and Stenson 2000; Hayes et al. 2018b).

The pupping season for harp seals occurs between late February and mid-March in the southern limits of their range (NOAA Fisheries Service 2015c). Following birth, pups are weaned quickly and adults again begin mating. Harp seals also go through a period of molting during the spring. During both of these times, large congregations of harp seals gather on pack ice (NOAA Fisheries Service 2015c).

While harps seals historically were a more northern North Atlantic and Arctic Ocean species, more recently, the numbers of harp seal strandings and sightings have increased as far south as New Jersey. Between 2011 and 2015, 78 harp seals stranded (mortalities) in New York and 22 stranded (mortalities) in New Jersey (Hayes et al. 2018b). During 2013, eight harp seals stranded (mortalities and alive) on Long Island (RFMRP 2014). All of those strandings occurred between January and June. The data, however, do not specify if those strandings in New York waters were along the southern coast of Long Island or within Long Island Sound. The closest known haul-out sites for seals in the vicinity of the Project area are located approximately 2.86 kilometers (1.78 statute miles) southwest of the Ambrose Channel Crossing site (Sandy Hook

Beach) and 16.1 kilometers (10 statute miles) east of the MP14.5 to MP16.5 site (Sandy Hook Beach) (NYSDEC n.d.[a]). Additional haul-out sites are located over 145 kilometers (90 statute miles) away in Montauk and the neighboring islands to the north (CRESLI n.d.; NYSDEC n.d.[b]; RFMRP 2014).

Harp seals occurring in New York and New Jersey waters between January and May would be at the extreme limit of their range. Therefore, while these are a coastal pinniped species, and they can occur as far south as the waters off Long Island, there is a limited potential they would occur in the vicinity of the Project. The RFMRP reported approximately 10 harp seal strandings in New York state waters in 2017 and 2018, and the MMSC reported 17 strandings in New Jersey state waters in 2018 (RFMRP 2018; MMSC 2018). Due to limited data, harp seals will not be considered in the modeling and take analysis; however, due to increased sightings in recent years within the Project Area by the RFMRP and MMSC, a conservative number of Level B takes will be requested based on anecdotal sighting information (see Section 6.5.2, Table 11).

3.3 Cetaceans

Ten cetacean species can occur in the Northeast and Mid-Atlantic region throughout the year and have been observed at some point in the waters offshore of Long Island. These cetaceans include both offshore and nearshore species, and their presence in waters off Long Island varies throughout the year. These species are the fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata acutorostrata*), North Atlantic right whale (*Eubalaena glacialis*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), coastal and offshore bottlenose dolphin (*Tursiops truncates truncatus*), harbor porpoise (*Phocoena phocoena*), long-finned pilot whale (*Globicephala melas*), common dolphin (*Delphinus delphis*), and short-finned pilot whale (*Globicephala macrorhynchus*) (Hayes et al. 2018a; Hayes et al. 2018b).

3.3.1 Fin Whale

The fin whale is a species of baleen whale from the Balaenopteridae family. Fin whales are the second largest of the whale species, reaching up to 22 meters (75 feet) in the Northern hemisphere subspecies and 26 meters (85 feet) in the Southern hemisphere subspecies (NOAA Fisheries Service 2015d). They are very streamlined whales with a dark-colored dorsal side and white-colored ventral side (NOAA Fisheries Service 2015d). Fin whales feed primarily during the summer on krill, small schooling fish such as herring (*Clupea* spp.) and sand lance (*Ammodytes* spp.), and squid (NOAA Fisheries Service 2015d). They fast during the winter.

Fin whales are considered low-frequency cetaceans, i.e., they are most sensitive to sounds under 1 kHz (Richardson et al. 1995). Based on their vocal capabilities, the fin whale's hearing range may extend as low as 10 Hz to 15 Hz. Fin whales produce two types of sounds, moans and tonal songs. Fin whale moans have frequency limits of 14 Hz to 118 Hz, with dominant frequencies at 20 Hz (Watkins 1981; Richardson et al. 1995). Tonal songs reportedly have dominant frequencies between 17 Hz and 25 Hz (Watkins 1981; Richardson et al. 1995).

Fin whales in the Atlantic Ocean have been classified as two different subspecies, one located in the North Atlantic and one located in the southern Atlantic Ocean. The fin whales in U.S. waters along the East Coast are considered to be from the Western North Atlantic stock (Hayes et al. 2018b). Fin whales are one of the most common large whale species observed in U.S. waters along the East Coast, occurring from Cape Hatteras, North Carolina, northward (CeTAP 1982; Hayes et al. 2018b). New England waters are a major feeding ground for this species, with calving potentially occurring in the Mid-Atlantic region of the U.S. (Hain et al. 1992; Hayes et al. 2018b). However, Hain et al. (1992) reports that the locations where the majority of the North Atlantic fin whale population mates and calves is unknown.

3.3.1.1 Numbers

The best abundance estimate available for fin whales in the Western North Atlantic as reported by Hayes et al. (2018b) is 1,618 (CV=0.33). This estimate is derived from 2011 NOAA Fisheries Service shipboard and aerial surveys conducted in waters north of New Jersey to the Bay of Fundy and between Virginia and central Florida (Palka 2012; Hayes et al. 2018b). These surveys did not include all of the stock's range in Canada; however, these are considered the best available data and current status of the U.S. population (Hayes et al. 2018b).

3.3.1.2 Status

The Western North Atlantic stock of fin whales is categorized as depleted and strategic under the MMPA, is federally listed as endangered under the ESA (as of 1970), and is state-listed in New York (NYDEC n.d.[c]) and New Jersey (NJDEP 2016) as endangered. The status of this stock relative to the OSP in the U.S. Atlantic EEZ is unknown (Hayes et al. 2018b).

3.3.1.3 Distribution

In the U.S. waters of the Atlantic Ocean, fin whales are common primarily from Cape Hatteras northward. There are no known population-wide seasonal migrations, but some migrations within the population may occur into Canadian waters, from coastal waters out to open ocean waters, and possibly into subtropical and tropical waters (Hayes et al. 2018b). Thus, fin

whales can be found throughout the year in U.S. waters off the East Coast between the Mid-Atlantic and New England waters. The species tends to occupy areas over the continental shelf proper as opposed to the shelf edge (CeTAP 1982) and is reported to prefer deeper offshore waters (NOAA Fisheries Service 2015d). During the 39-month period of studies (1978-1982) associated with the Cetaceans and Turtle Assessment Program (CeTAP) between Cape Hatteras, North Carolina, and the Gulf of Maine, seasonal affinities for fin whales were noted. An increase in sightings in the areas around Jeffrey's Ledge, Stellwagen Bank, and just east of Cape Cod appear to show this is an important habitat during the spring and summer (CeTAP 1982). There also appears to be an increased abundance in the vicinity of the Delaware Bay/Delaware Peninsula region during the winter and spring (CeTAP 1982). Fin whales may occur near the Project Area and have been observed in the waters off Long Island, more commonly off the eastern end of the island; however, some sightings have occurred offshore of New Jersey (CeTAP 1982).

Between 2011 and 2015, seven fin whale mortalities or serious injuries were recorded in the vicinity of the Project area (Hayes et al. 2018b). In December 2012, a fin whale stranded in Breezy Point, Queens (Newman et al. 2012). The director of the RFMRP, the stranding response unit on Long Island, reported that it is rare to see a large whale near the shore in this area. The last time prior to 2012 a fin whale stranded in this area was in 1964, in the Hudson River (Newman et al. 2012). Another fin whale stranded on January 13, 2013 (RFMRP 2014), and the MMSC reported one stranded mortality in New Jersey waters in 2018 (MMSC 2018).

3.3.2 Humpback Whale

The humpback whale is a species of baleen whale from the Balaenopteridea family. Humpback whales, like all baleen whales, are sexually dimorphic, with females being larger than males. Adult humpback whales can reach up to 18 meters (60 feet) in length and can weigh 22,000 to 80,000 kilograms (50,000 to 80,000 pounds) (NOAA Fisheries Service 2016b). Humpback whales are best recognized (and named for) their long pectoral fins, which can reach up to 4.6 meters (15 feet) in length. Their body color is primarily dark gray, with variable amounts of white on their ventral sides and on the undersides of their pectoral fins (NOAA Fisheries Service 2016b). Humpback whales spend the vast majority of their time during the summer feeding and building up their fat stores, which are depleted during the winter (NOAA Fisheries Service 2016b). These whales filter feed primarily on small crustaceans (krill), plankton, and some fish species. When in New England waters, the whales are often more piscivores relative to other populations,

feeding on herring (*Clupea harengus*), sand lance (*Ammodytes* spp.), and other species of small fish (Hayes et al. 2018b).

As a baleen whale, humpback whales are considered low-frequency cetaceans, i.e., they are most sensitive to sounds less than 1 kHz (Richardson et al. 1995). Because of the complications related to measuring hearing ranges, sensitivities, and localization of large, free-ranging whales, it is assumed that the sound production range of the species is an indicator of the species hearing range (Richardson et al. 1995). Humpbacks are known to produce various vocalizations, including the humpback "song," moans, grunts, pulse trains, and clicks (Richardson et al. 1995). While humpback whales are considered low-frequency cetaceans, there are components of their vocalizations that are greater than 1 kHz. For example, during mating, humpback whales produce songs with frequencies ranging from 30 Hz to 8 kHz (Payne and Payne 1985). They produce moans at frequencies between 20 Hz and 1.8 kHz, grunts at frequencies between 25 Hz and greater than 1.9 kHz (Thompson et al. 1986), and clicks at frequencies between 2 kHz and 8.2 kHz (Beamish 1979).

3.3.2.1 Numbers

The North Atlantic population of humpback whales (which includes the Gulf of Maine stock) was estimated at 4,894 males and 2,804 females, based on genetic tagging data collected by the Years of the North Atlantic Humpback (YoNAH) project in 1992 and 1993 on humpback whale breeding grounds (Palsboll et al. 1997; Hayes et al. 2018a). However, the sex-ratio in the North Atlantic population is known to be even (Palsboll et al. 1997); thus, the population estimate is assumed to be an underestimate of actual population size (Hayes et al. 2018a). An ocean basin-wide estimate from the YoNAH project was 11,570 (CV=0.068) (Stevick et al. 2003). The Gulf of Maine stock was estimated to be 823 in 2008 based on photo-identification; however, this is an outdated estimate, and the data are over eight years old (Hayes et al. 2018b). Currently, the best abundance estimate for the Gulf of Maine stock is 335 based on aerial and ship-based surveys in 2011. These surveys did not include the Scotian Shelf, which is a known part of the Gulf of Maine stock range (Hayes et al. 2018b).

The overall North Atlantic humpback whale population was found to be increasing, with an estimated average growth rate of 3.1% annually between 1979 and 1993 (Stevick et al. 2003). Population growth rates in the Gulf of Maine stock were estimated at 6.5% annually (Barlow and Clapham 1997).

3.3.2.2 Status

On September 8, 2016, NOAA Fisheries Service identified 14 Distinct Population Segments (DPS) of the humpback whale and revised the species-wide listing (81 FR 21276). The Gulf of Maine stock of humpback whales, grouped under the West Indies DPS, was deemed not warranted for listing under the ESA. NOAA Fisheries Service has recently determined that the Gulf of Maine stock is considered not depleted because it does not coincide with an ESA-listed DPS and the stock is not considered strategic because the mortality and serious injury record does not exceed the calculated Potential Biological Removal (NOAA Fisheries Service 2018e). Humpback whales are state-listed in New York (NYDEC n.d.[c]) and New Jersey (NJDEP 2016) as endangered; however, the state status has not been reviewed since the change in federal status.

3.3.2.3 Distribution

Humpback whales are a global species and occur in all major oceans, including sub-polar, temperate, and equatorial regions. In the Western North Atlantic, humpback whales occur all along the East Coast of the U.S., in the Gulf of St. Lawrence, and off Newfoundland, Labrador, and western Greenland (Katona and Beard 1990), with other feeding grounds near Iceland and northern Norway (Christensen et al. 1992; Palsboll et al. 1997). The individual North Atlantic feeding regions are associated with discrete subpopulations. For management purposes, the humpback whales known to feed in the Gulf of Maine with strong fidelity were designated as a U.S. stock (Hayes et al. 2018b).

Many of the humpback whales from the North Atlantic feeding grounds can be found in wintering calving grounds throughout the West Indies (Katona and Beard 1990). However, not all whales from the North Atlantic migrate to the winter calving grounds. Some studies indicate that many humpback whales remain in higher latitudes during the winter (Swingle et al. 1993; Clapham et al. 1993).

The North Atlantic populations of humpback whales generally remain within their respective feeding groups throughout the summer in northern latitudes, where they consume up to 1,360 kilograms (3,000 pounds) of forage a day and develop a fatty layer (blubber) that facilitates their survival during migration periods and throughout the winter (NOAA Fisheries Service 2016b). The whales migrate south during the winter to breeding and calving grounds in the West Indies, where genetic mixing occurs among separate feeding groups (Katona and Beard 1990; Palsboll et al. 1997; Stevick et al. 1998). However, a number of whales do not migrate and

remain in mid- to high-latitude regions (Swingle et al. 1993) such as the Chesapeake Bay, Delaware Bay, and waters along southeastern states (Swingle et al. 1993; Wiley et al. 1995).

There have been anecdotal reports of increased sightings of live humpback whales in the Project area (Hynes 2016; Brown et al. 2018a). Between 2011 and 2016, there have been at least 46 humpback whale sightings within Lower New York Bay, Upper New York Bay, and Raritan Bay (Brown et al. 2018a). Most sightings occurred during the summer months (July to September), with no documented sightings in the winter (Brown et al. 2018a). Brown et al. (2018b) presented data collected from 2011-2017 by Gotham Whale, New York City's Whale Research and Advocacy Organization, during the State of the Science Workshop on Wildlife and Offshore Wind Energy Development November 13-14, 2018. Brown et al. (2018b) reported a total of 617 humpback whale sightings within the New York Bight.

Humpback whales were reported in confirmed human-caused mortality or serious injury in the waters off New York and northern New Jersey between 2011 and 2015. In April and August 2013, two humpback whales were reported as stranded along the Long Island coast (RFMRP 2014). NOAA Fisheries Service has declared an Unusual Mortality Event (UME) for humpback whales along the Atlantic coast due to increased stranding numbers for 2016 through 2018 (total of 84 through September 30, 2018) (NOAA Fisheries Service 2018a). NOAA Fisheries Service suspects that the UME is related to human interactions (i.e., vessel strikes). Of the 84 strandings, 24 occurred off New Jersey and New York, which accounts for 29% of the total strandings along the Atlantic coast. During the summer, humpback whales are commonly observed well to the east of the Project area, off Montauk Point, Long Island, and in higher concentrations further north around George's Bank and in the Stellwagen Bank area in the Gulf of Maine (CeTAP 1982; Hayes et al. 2018b).

Although densities of humpback whales are low nearby the Project area based on Roberts et al. (2016), anecdotal reports suggest that humpbacks are occasionally seen approaching or within the Project area. Based on the known distribution of this species in New York and New Jersey waters during the summer months, humpback whales could occur in the vicinity of the Project area during the in-water construction period.

3.3.3 Minke Whale

The minke whale is a species of baleen whale from the Balaenopteridae family. The minke whale is the smallest of the baleen whales in waters surrounding North America (NOAA Fisheries Service 2015e). Adult minke whales can reach up to 10.7 meters (35 feet) in length, and weigh

up to 9,200 kilograms (20,000 pounds) (NOAA Fisheries Service 2015e). Similar to other baleen whale species, there is a slight sexual dimorphism in this species, and females may be slightly larger than males. The minke whale has a sleek body with dark grayish-brown coloration and a pale chevron shape on the back behind the head. The ventral side is a lighter white color, and the tall dorsal fin is located approximately two-thirds of the way down the back (NOAA Fisheries Service 2015e). Like other baleen whales, minke whales feed seasonally. They feed on a variety of plankton, krill, and fish species, including cod and herring.

As with the other baleen whales, minke whales are considered low-frequency cetaceans, i.e., they are most sensitive to sounds under 1 kHz (Richardson et al. 1995). Because of their vocal capabilities, it is thought that the minke whale's hearing range extends to as low as 60 Hz (Richardson et al. 1995). Minke whales can produce various types of sounds, including down sweeps, moans/grunts, and clicks. Though minke whales are considered low-frequency cetaceans, there are components of their vocalizations that are greater than 1 kHz. For example, clicks have been reported within the frequency range of 3.3 kHz to 20 kHz (Beamish and Mitchell 1973). Other sounds produced by minke whales, such as down sweeps, moans and grunts, fall within the frequency range of 60 Hz to 140 Hz (Schevill and Watkins 1972).

3.3.3.1 Numbers

Hayes et al. (2018b) reports that the total estimated population of Canadian East Coast stock of minke whales is 2,591 (CV=0.81), derived from 2011 shipboard and aerial surveys conducted during June-August 2011 (Palka 2012). This estimate is considerably lower than Waring et al. (2016) because previous estimates included data that were deemed unreliable.

3.3.3.2 Status

The Canadian East Coast stock of minke whale is not categorized as depleted or strategic under the MMPA, is not federally listed as threatened or endangered under the ESA, and is not state-listed in the states of New York or New Jersey. The status of minke whales relative to OSP in the U.S. Atlantic EEZ is unknown (Hayes et al. 2018b).

3.3.3.3 Distribution

Minke whales are a global species with a widespread occurrence throughout high-latitude, temperate, and tropical waters (Hayes et al. 2018b). Four sub-populations are currently recognized in the North Atlantic: (1) Canadian east coast, (2) west Greenland, (3) central North Atlantic, and (4) northeastern North Atlantic (Donovan 1991), as delineated based on sex and length, catch distributions, sightings, marking data, and pre-existing International Council for the

Exploration of the Sea (ICES) boundaries (Hayes et al. 2018b). For management purposes, minke whales occurring off the East Coast of the U.S. are considered to be in the Canadian Eastern Coastal stock, which encompasses the area from the western half of the Davis Straight to the Gulf of Mexico (Hayes et al. 2018b).

Minke whales generally occur near the surface and in the upper water column of the ocean throughout their range, except in polar seas. The relationships between the four North Atlantic stocks are unknown, and the presence of sub-populations is unknown (Hayes et al. 2018b). Minke whales are distributed on both the continental shelf and in deeper waters offshore (Hayes et al. 2018b). Minke whales in waters off the East Coast of the United States appear to have a strong seasonal component to their distribution throughout their range. During the spring and summer, they appear to be widely distributed from just east of Montauk Point, Long Island, northeast to Nantucket Shoals, and north towards Stellwagen Bank and Jeffrey's Ledge (CeTAP 1982). During the fall, their range is much smaller and their abundance is reduced throughout their range (CeTAP 1982). During the winter, these whales are largely absent from the vicinity of the Project area (Waring et al. 2012). During the 39-month period of studies associated with the CeTAP that took place between 1978 and 1982 between Cape Hatteras, North Carolina, and the Gulf of Maine, only three minke whales were observed south of Long Island during the fall months, and no sightings of minke whales were made south of Long Island during winter months (CeTAP 1982).

Between 2011 and 2015, six minke whales were reported in confirmed human-caused mortality or serious injury in the waters off New Jersey and along the coast of Long Island (Hayes et al. 2018b). Since January 2017, minke whale mortalities have increased along the Atlantic coast from South Carolina to Maine. NOAA Fisheries Service has declared a UME for minke whales along the Atlantic coast due to stranding numbers for 2017 and 2018 (total of 52 through September 30, 2018) (NOAA Fisheries Service 2018b). Of the 52 strandings, 10 occurred along the New York coast and three occurred along the New Jersey coast. Based on occurrence information, stranding records, and injury/mortality records, minke whales could occur in the vicinity of the Project area during the spring, summer, and fall months, specifically during the in-water construction period.

3.3.4 North Atlantic Right Whale

The North Atlantic right whale is a species of baleen whale from the Balaenidae family. Adult North Atlantic right whales measure between 14 meters and 17 meters (45 feet and 55 feet) in length and can weigh up to 63,503 kilograms (70 tons) (NOAA Fisheries Service 2004). The

species is sexually dimorphic, with females being generally larger than males (NOAA Fisheries Service 2004). The North Atlantic right whale has several distinguishing features, including a stocky body, large head, a highly arched margin of the lower lip, a v-shaped blow, lack of a dorsal fin, and callosities in the head region (NOAA Fisheries Service 2004; Reeves et al. 2002b).

North Atlantic right whales feed by skimming the surface with mouths open, filtering plankton through baleen plates (Reeves et al. 2002b). Copepods preferred by the right whale include *Calanus finmarchicus*, *Centropages typicus*, and *Pseudocalanus* spp. (Pendleton et al. 2005). These are predominantly cool-water oceanic species typically concentrated greater than 10 kilometers (6.2 statute miles) from shore (Turner and Dagg 1983). Right whales are most often seen foraging alone. However, potential feeding aggregations have been observed in areas such as offshore of Rhode Island (Reeves et al. 2002b; Kenney and Vigness-Raposa 2010).

The North Atlantic right whale is considered sensitive primarily to low-frequency sounds, similar to the humpback, fin, and minke whales. Right whales have been recorded producing tonal sounds between 20 and 1,000 Hz (Parks and Tyack 2005), and vocalizations in the 20 to 200 Hz range (Mellinger 2004). The sounds recorded by Mellinger were reported as an “up call,” which represents an upsweep of frequencies from lower to higher and is a common vocalization produced by right whales. Right whales have also been recorded producing sounds called “moans” at less than 400 Hz (Watkins and Schevill 1972) and “gunshots” with the dominant frequencies ranging from 50 to 2,000 Hz (Parks et al. 2005).

3.3.4.1 Numbers

The best abundance estimate of the Western North Atlantic stock of North Atlantic right whales is based on sighting histories of individual whales known through photo-identification databases as it existed on October 20, 2016 (Hayes et al. 2018b). Based on this census, the best population estimate is 458 individuals, and the minimum population estimate is 455 individuals (Hayes et al. 2018b). As of 2015, data suggest that the overall abundance has declined. (Pace et al. 2017; Hayes et al. 2018b). The best models of density indicate different best abundance estimates by season ranging from 264 (CV=0.07) in summer to 574 (CV=0.45) in winter (Roberts et al. 2016). However, the Roberts et al. (2016) models do not include data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys (NEFSC and SEFSC 2010, 2011, 2012, 2013, 2014, 2015).

3.3.4.2 Status

The North Atlantic right whale is categorized as depleted and strategic under the MMPA, has been federally listed as endangered under the ESA since 1970, and is listed in New York State (NYSDEC n.d.[c]) and New Jersey (NJDEP 2016) as endangered. NOAA Fisheries Service has declared a UME for North Atlantic right whales along the Atlantic coast due to 20 confirmed mortalities between June 2017 and April 2018 (as of October 15, 2018; NOAA Fisheries Service 2018c). No critical habitat for the North Atlantic right whale exists in the Project area or anywhere within the waters off southern Long Island. The closest critical habitat to the Project area is the Great South Channel, located to the east of Cape Cod. Critical habitat is also located in Cape Cod Bay and in coastal Florida and Georgia, from Sebastian Inlet to the Altamaha River (NOAA Fisheries Service 2004; NOAA Fisheries Service 2016c).

3.3.4.3 Distribution

The North Atlantic right whale occurs in U.S. waters spanning the entire East Coast from Florida to the Gulf of Maine and into Canadian waters of the Bay of Fundy and the Scotian Shelf (Hayes et al. 2018b). The species is primarily found along the coastal region and inner continental shelf, which is likely due to the availability and distribution of their preferred prey—late stage juvenile and adult copepods, which are mostly found close to the coast (Baumgartner and Mate 2005; NOAA Fisheries Service 2004). For management purposes in the United States, there is only one stock of North Atlantic right whales, referred to as the Western Atlantic stock. While primarily found in the coastal waters of the U.S., individuals have been observed in waters off Norway, Greenland, and the Azores (Hayes et al. 2018b).

Right whales migrate annually between winter calving grounds in the lower latitudes to spring and summer foraging grounds in higher latitudes (NOAA Fisheries Service 2004). In U.S. waters, right whales generally can be seen in the winter off the coast of Georgia and northern Florida where reproductive females go to calve, and in the summer they can be found in the waters of New England, foraging and nursing their young (NOAA Fisheries Service 2004). When in New England waters, right whales are most abundant in Cape Cod Bay, the Gulf of Maine, and the Great South Channel (NOAA Fisheries Service 2004). While these known congregation areas have been established as high-use areas, frequent travel along the East Coast of the U.S. is also common. Photo-identification has shown North Atlantic right whales making round-trip migrations to an area off the southeastern U.S. and back to Cape Cod Bay at least twice during the winter (Brown and Marx 2000).

During their migration between foraging grounds in the northeast region and calving grounds in the southern region, right whales are most likely to be found in the vicinity of the Project area from November through April. During this time, seasonal management areas (SMA) are in effect within a 37-kilometer (19-statute-mile) radius of several major ports along the U.S. East Coast. A portion of the Project area is within one such SMA, which is associated with the Port of New York and New Jersey (Figure 7). While the migration period for North Atlantic right whales generally ends each year on April 30, there is still the potential for this species to occur in the vicinity of the Project area during late spring and into the summer before returning in late fall/winter. In recent years, right whales have also been observed off Long Island during the summer, outside of the migration period (NEFSC 2016). According to the NOAA Fisheries Service Northeast Fisheries Science Center's (NEFSC) North Atlantic Right Whale Sighting Advisory System (SAS), 50 right whale observations were reported in the waters south of Long Island and north of New Jersey between January 2007 and September 2016 (NEFSC 2016). Of those sightings, nine were close to the Project area. An additional sighting was made near the Project area in December 2016 (Raslich 2016). Right whales are not expected to be foraging along the southern coast of Long Island, including the Project area, as their main prey species are typically concentrated in offshore waters several statute miles seaward of the Project area (Turner and Dagg 1983) and right whale foraging behavior has never been documented near the coast of Long Island. Therefore, any right whales in the vicinity of the Project are expected to be transient, either migrating through the area from late fall until late April, or spending short amounts of time within the waters southeast of Long Island.

3.3.5 Atlantic White-Sided Dolphin

The Atlantic white-sided dolphin is a species of toothed whale from the Delphinidae family. Adult Atlantic white-sided dolphins range from 2.7 meters (9 feet [males]) to 2.5 meters (8 feet [females]) in length and can weigh from 180 to 225 kilograms (400 to 500 pounds) (NOAA Fisheries Service 2015f). Similar to other Delphinidae species, the Atlantic white-sided dolphin has a robust body shape with a short rostrum. However, this species has an identifiable color pattern, which includes a bi-colored rostrum; black dorsal side, fluke, flippers, and dorsal fin; white ventral side and lower rostrum; and gray sides. Their most distinguishing characteristic is the white patch that begins below the dorsal fin and is bordered by a yellow/tan streak down to the fluke (NOAA Fisheries Service 2015f).

Union County
New Jersey

Richmond County
New York

Kings County
New York

Queens County
New York

Rockaway
Delivery Lateral

Raritan Bay
Loop (Offshore)

Raritan Bay

MP 35.49

NEW YORK
NEW JERSEY

Morgan M&R
Station

MP 12.00

STA. 207

MP 8.57

Madison
Loop

Somerset County
New Jersey

Middlesex County
New Jersey

Monmouth County
New Jersey

Mercer County
New Jersey

Mid-Atlantic
New York/New Jersey SMA

State Waters

Federal Waters

Atlantic
Ocean

Compressor Station 206
Site Alternatives

Legend

- Milepost
- Existing Compressor Station
- Existing Meter & Regulating Station
- Proposed Compressor Station
- Proposed Pipeline
- Existing Transco Pipeline
- County Boundary
- State Boundary
- State/Federal Offshore Line
- Seasonal Management Areas for North Atlantic Right Whales

N

0 1 2
Miles

1:180,000

NOTES

SITE LOCATION

FIGURE 7
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
NORTH ATLANTIC RIGHT WHALE SEASONAL MANAGEMENT AREA
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Data Sources: BOEM 2005; Williams 2017; E&E 2017; ESRI 2012, 2017; NOAA NMFS 2008; NYS Office of Information Technology Services GPO 2016; New Jersey Office of GIS 2016; U.S. Census Bureau 2016; BOEMRE 2010.

Date: 6/18/2018

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Atlantic white-sided dolphins of the Western North Atlantic stock generally show a preference for several fish and invertebrate species, including silver hake (*Merluccius bilinearis*), spoonarm octopus (*Bathypolypus bairdii*), and haddock (*Melanogrammus aeglefinus*). The dolphins consume Atlantic herring (*Clupea harengus*) most often in summer but do not heavily prey upon the fish during winter months, suggesting a seasonal variation in diet (Craddock et al. 2009).

Atlantic white-sided dolphins are considered mid-frequency cetaceans. In general, the estimated bandwidth for functional hearing in mid-frequency cetaceans is 150 Hz to 160 kHz (Southall et al. 2007). Atlantic white-sided dolphins, like many toothed whales, are very vocal animals, using echolocation for feeding and navigation and vocalizing for socialization (Southall et al. 2007). However, unlike large baleen whales, hearing has been directly tested in many toothed whales by both behavioral reactions to sounds and direct measurements to hearing through AEP methods (Southall et al. 2007).

3.3.5.1 Numbers

The total number of Atlantic white-sided dolphins in the Western North Atlantic stock is based on population estimates, which have been calculated since 1978. The best available current population estimate is 48,819 (CV=0.61), which is based on June-August 2011 shipboard and aerial surveys from central Virginia to the lower Bay of Fundy (Palka 2012; Hayes et al. 2018b).

3.3.5.2 Status

The Western North Atlantic stock of the Atlantic white-sided dolphin is not categorized as depleted or strategic under the MMPA, is not federally listed as threatened or endangered under the ESA, and is not listed in the states of New York or New Jersey. The status of these dolphins relative to the OSP in the U.S. Atlantic EEZ is currently unknown (Hayes et al. 2018b).

3.3.5.3 Distribution

The Atlantic white-sided dolphin occurs throughout temperate and sub-polar waters of the North Atlantic, most prominently in continental shelf waters to depths of approximately 100 meters (330 feet) (Hayes et al. 2018b). Atlantic white-sided dolphins of the Western North Atlantic stock inhabit waters from central west Greenland to North Carolina and as far east as the mid-Atlantic ridge (Hamazaki 2002; Doksaeter et al. 2008; Hayes et al. 2018b). Seasonal shifts in abundance occur throughout the western North Atlantic region, where the dolphins appear to be more prevalent from Georges Bank to the lower Bay of Fundy from June through September. From

October to December, they appear to occur at intermediate densities from southern Georges Bank to the southern Gulf of Maine (Payne et al. 1990; Hayes et al. 2018b). Sightings of dolphins south of Georges Bank (Hudson Canyon in particular) occur year-round, but generally at lower densities (Hayes et al. 2018b).

Based on observations made during the CeTAP (1982) surveys, Atlantic white-sided dolphins were found primarily east and north of Long Island and the Project area. The Atlantic white-sided dolphins observed south of Long Island were farther offshore in the deeper water of the continental shelf proper and closer to the continental shelf slope. This species was largely absent from the overall region (Cape Hatteras, North Carolina, to the Gulf of Maine) during the winter (CeTAP 1982).

Atlantic white-sided dolphins have stranded along the coasts of New York and New Jersey in recent years. Between 2011 and 2015, five Atlantic white-sided dolphins stranded in New York and one stranded in New Jersey (Hayes et al. 2018b). During 2013, two Atlantic white-sided dolphins stranded along the Long Island coast (RFMRP 2014); these strandings occurred in March and May.

Based on the known occurrence of this species in New England waters east and north of the Project area during the spring, summer, and fall, and the overall lack of presence throughout the region during the winter, the Atlantic white-sided dolphin is not expected to occur in the vicinity of the Project area during the in-water construction period. Due to their low density and unlikely presence in the Project area, Atlantic white-sided dolphins will not be considered further in this analysis.

3.3.6 Bottlenose Dolphin

The bottlenose dolphin is a species of toothed whale from the Delphinidae family. Adult bottlenose dolphins range from 1.8 meters to 4.8 meters (6 feet to 12.5 feet) in length and can weigh up to 635 kilograms (1,400 pounds) (NOAA Fisheries Service 2015g). There are two genetically distinct bottlenose dolphin morphotypes described as coastal and offshore stocks. These species are sexually dimorphic, with males being slightly larger than females (NOAA Fisheries Service 2015g). The bottlenose dolphin is one of the most recognized marine mammal species, with a short, thick rostrum, light gray color, and robust body shape (NOAA Fisheries Service 2015g).

Bottlenose dolphins are generalist feeders, feeding on prey items that are native to the area or region they are in (NOAA Fisheries Service 2015g). Prey species for coastal bottlenose

dolphins include various benthic invertebrates and fish species, while offshore bottlenose dolphins prey on various squid and fish species.

Like the Atlantic white-sided dolphin, both bottlenose dolphin stocks are considered mid-frequency cetaceans. The estimated general bandwidth for functional hearing in mid-frequency cetaceans is 150 Hz to 160 kHz (Southall et al. 2007). Bottlenose dolphins, like many toothed whales, are very vocal animals, using echolocation for feeding and navigation and vocalizing for socialization (Southall et al. 2007).

3.3.6.1 Numbers

The best abundance estimate for the western North Atlantic Northern Migratory Coastal stock of bottlenose dolphins is derived from aerial surveys conducted during the summer of 2016 covering the coastal and shelf waters (to depths of 20 meters [66 feet]) from Assateague, Virginia, to Sandy Hook, New Jersey. Based on this survey, the best abundance estimate is 6,639 (CV=0.41) (Hayes et al. 2018b).

The best abundance estimate for the western North Atlantic Offshore stock of common bottlenose is derived from aerial surveys conducted in the summer of 2011 covering waters from Florida to the Lower Bay of Fundy. Based on these surveys, the best abundance estimate is 77,532 (CV=0.40) (Hayes et al. 2018a). Abundance estimates are not reported by stocks in Roberts et al. (2016) density estimates, so no abundance estimate can be extrapolated for the coastal stock from these models. Therefore, the take estimation analysis for bottlenose dolphins in this authorization application is based on the total combined population of coastal and offshore bottlenose (see Section 6).

3.3.6.2 Status

The western North Atlantic Northern Migratory Coastal stock of bottlenose dolphin is categorized as depleted and strategic under the MMPA (Hayes et al. 2018b). However, this species is not federally listed as threatened or endangered under the ESA and is not listed in the states of New York or New Jersey. The western North Atlantic Offshore stock of bottlenose dolphin is not considered depleted or strategic under the MMPA and it is not listed as threatened or endangered under the ESA (Hayes et al. 2018a).

3.3.6.3 Distribution

Bottlenose dolphins are a global species and inhabit most of the temperate and tropical waters of the world (NOAA Fisheries Service 2015g). For management purposes, bottlenose dolphins off the East Coast of the U.S. have been divided into two morphologically and genetically

distinct morphotypes—coastal and offshore (Hayes et al. 2018b). These two morphotypes have been further divided into 16 stocks. Within the coastal morphotype, the stocks are divided into coastal migratory or estuarine bottlenose dolphins. Many of the estuarine morphotypes appear to be residents of their particular region or area, based on photo-identification. For example, the Biscayne Bay stock remain year-round within the bay and are genetically distinct from those dolphins residing nearby in the estuary of Florida Bay (Waring et al. 2016). Of the 16 bottlenose dolphin stocks present along the U.S. East Coast, the Northern Migratory Coastal stock is most likely to be found in the vicinity of the Project area, though the northern limit of the stock range as described in Hayes et al. (2018b) is slightly south of the Project area.

The western North Atlantic Northern Migratory Coastal stock of bottlenose dolphins can be found between Long Island, New York, and Cape Hatteras, North Carolina, from July through September (CeTAP 1982). During the winter, dolphins from this stock are rarely seen north of the North Carolina/Virginia border. Their movements north could be determined by water temperature (Garrison 2003). While in the Long Island region during the summer, this coastal stock remains between the shoreline and the 25-meter (82-foot) depth contour (Hayes et al. 2018). The offshore stock is primarily distributed along the outer continental shelf in waters greater than 40 meters (131 feet) (Hayes et al. 2018a).

Bottlenose dolphins have stranded along the New York and New Jersey coasts in recent years. From 2011 to 2015, 62 bottlenose dolphins stranded in New York and 236 stranded in New Jersey (Hayes et al. 2018b). However, the majority of those strandings occurred in 2013, with 38 strandings in New York and 153 strandings in New Jersey. The stock identity of these strandings is highly uncertain and may include individuals from the coastal and offshore stocks (Hayes et al. 2018b). NOAA Fisheries Service declared a UME for bottlenose dolphins in the mid-Atlantic region, beginning in early July 2013 and ending March 2015 (NOAA Fisheries Service 2015l). This UME included elevated numbers of strandings in New York, New Jersey, Delaware, Maryland, and Virginia.

Based on the known distribution of this species in warmer southern waters during the winter and its occurrence in the vicinity of the Project area during the summer and fall, bottlenose dolphins could occur in the vicinity of the Project during the in-water construction period, specifically during the later spring and summer.

3.3.7 Harbor Porpoise

The harbor porpoise is a species of toothed whale from the Phocoenidae family. Adult harbor porpoises range from 1.5 meters to 1.7 meters (5 feet to 5.5 feet) in length and can weigh up to 77 kilograms (170 pounds) (NOAA Fisheries Service 2015h). This species is sexually dimorphic, with females being slightly larger than males. This species has a small, robust, dark gray body with white ventral side, triangular dorsal fin, and short rostrum (NOAA Fisheries Service 2015h). Harbor porpoises feed on both demersal and benthic species, primarily schooling fish and cephalopods (NOAA Fisheries Service 2015h).

Harbor porpoises are considered high-frequency cetaceans. In general, the estimated bandwidth for functional hearing in high-frequency cetaceans is 200 Hz to 180 kHz (Southall et al. 2007). Similar to the bottlenose dolphin (and other odontocetes), harbor porpoises are vocal animals, using echolocation for feeding and navigation and vocalizing for socialization (Southall et al. 2007). Direct behavioral reaction testing and AEP methods have provided audiograms for harbor porpoises (Southall et al. 2007).

3.3.7.1 Numbers

The best abundance estimate for the Gulf of Maine/Bay of Fundy stock of harbor porpoise, derived from a June-August 2011 shipboard and aerial survey, is 79,883 (CV=0.32) (Palka 2012; Hayes et al. 2018b). The density estimates used in Transco's analysis predict an abundance of 48,049 (CV=0.12) in summer (Roberts et al. 2016). However, Roberts et al.'s estimate does not include the data from AMAPPS surveys in 2011 (NEFSC and SEFSC 2011), which was used to calculate the Palka (2012) estimate.

3.3.7.2 Status

The Gulf of Maine/Bay of Fundy stock of harbor porpoise is not categorized as depleted or strategic under the MMPA (Hayes et al. 2018b). It is not federally listed as threatened or endangered; however, it is listed as a species of concern in New York and New Jersey state waters (NYSDEC n.d.[d]; NJDEP 2017).

3.3.7.3 Distribution

Harbor porpoises occur in the coastal and offshore waters of the Atlantic Ocean. In the Western North Atlantic, the species ranges from West Greenland to Cape Hatteras, North Carolina, and in the eastern North Atlantic, the species ranges from the Barents Sea to West Africa (NOAA Fisheries Service 2015h). Within these areas, they most often occur in water less than 198 meters (650 feet) deep, especially in bays, estuaries, and harbors (NOAA Fisheries

Service 2015h). For management purposes, NOAA Fisheries Service has divided harbor porpoises in U.S. waters into 10 stocks. Of those 10 stocks, only one, the Gulf of Maine/Bay of Fundy stock, occurs along the U.S. East Coast and thus could occur in the vicinity of the Project area.

The Gulf of Maine/Bay of Fundy stock of harbor porpoise can be found over the continental shelf between the Gulf of Maine/Bay of Fundy region and North Carolina in varying abundance, depending on the season (Hayes et al. 2018b). During the summer, this stock can be found primarily concentrated in the northern Gulf of Maine and the southern Bay of Fundy (Hayes et al. 2018B). While in this region, harbor porpoises inhabit waters less than approximately 150 meters (500 feet) deep (Hayes et al. 2018b). During the fall and spring, this species occurs between Maine and New Jersey; however, during these months they are widely dispersed throughout this range (Hayes et al. 2018b). During winter, harbor porpoises are also dispersed between New Jersey and North Carolina, with much lower densities also found between New York and Canada (Hayes et al. 2018b; CeTAP 1982). To date, no research has supported either a migration triggered by water temperature or a specific migration route throughout its range. In 2011, six sightings were made inside the Long Island Sound and one just outside the Sound (NEFSC and SEFSC 2011). This suggests the possibility that harbor porpoise may occur more commonly in bays in winter, or possibly, ocean conditions and prey distribution resulted in unusual use of Long Island Sound in winter of 2011.

Harbor porpoises have stranded along the New York and New Jersey coasts in recent years. Between 2011 and 2015, 33 harbor porpoises stranded in New York and 17 stranded in New Jersey (Hayes et al. 2018b). During 2013, 14 harbor porpoises stranded along the Long Island coast (RFMRP 2014), and in 2018, the MMSC reported five strandings in New Jersey waters (MMSC 2018).

Based on the current understanding of the species' distribution, harbor porpoises could be present, in varying densities, in the region and within the vicinity of the Project area during fall, winter, and spring. Because the species is widely distributed throughout the region during this timeframe, harbor porpoises could be present in the vicinity of the Project area during the in-water construction period, specifically during winter through late spring.

3.3.8 Long-Finned Pilot Whale

The long-finned pilot whale is one of two species of pilot whale (*Globicephala* sp.,) and is a species of toothed whale from the Delphinidae family. Adult long-finned pilot whales, similar to

the short-finned pilot whale, are larger than most members of the Delphinidae family. Adults range in length from 5.8 meters (19 feet [females]) to 7.6 meters (25 feet [males]) and can weigh between 1,300 kilograms (2,900 pounds [females]) and 2,300 kilograms (5,000 pounds [males]) (NOAA Fisheries Service 2015i). The long-finned pilot whale is very similar in appearance to the short-finned pilot whale; however, its pectoral fins are long and tapered in a sickle shape. This characteristic gives the species its common name. Because the largely distinguishing characteristic for this species is often below the water, it is difficult to differentiate long-finned and short-finned pilot whales during aerial and boat surveys.

Similar to short-finned pilot whales, long-finned pilot whales primarily occur in deeper waters. However, this species is more common in temperate to sub-polar oceanic waters (NOAA Fisheries Service 2015i). Long-finned pilot whales are deep divers, commonly diving to depths of 200 meters to 500 meters (656 feet to 1,640 feet) for feeding. While at depth, long-finned pilot whales feed on a variety of species, including cod, herring, hake, squid, octopus, and shrimp (NOAA Fisheries Service 2015i).

Long-finned pilot whales are considered mid-frequency cetaceans. In general, the estimated bandwidth for functional hearing in mid-frequency cetaceans is 150 Hz to 160 kHz (Southall et al. 2007).

3.3.8.1 Numbers

The best abundance estimate for the Western North Atlantic stock of the long-finned pilot whale is derived from 2011 surveys from central Virginia to the lower Bay of Fundy. Based on this information, the best abundance estimate is 5,636 (CV=0.63), but these surveys did not cover the Scotian Shelf where high densities of pilot whales have been observed in the past (Hayes et al. 2018a).

3.3.8.2 Status

The Western North Atlantic stock of the long-fined pilot whale is not categorized as strategic under the MMPA, is not federally listed as threatened or endangered under the ESA (NOAA Fisheries Service 2018e), and is not listed as a species of concern in New York or New Jersey state waters.

3.3.8.3 Distribution

Long-finned pilot whales are a global species and can inhabit the waters of colder temperate and sub-polar regions, such as southern Australia, Cape Province (South Africa), Chile, the Gulf of St. Lawrence, and Greenland. In U.S. waters, they range along the East Coast.

For management purposes, long-finned pilot whales consist of only one stock, the Western North Atlantic stock.

The Western North Atlantic stock of the long-finned pilot whale ranges along the continental shelf of the U.S. East Coast between the Mid-Atlantic region and the Gulf of Maine. Long-finned pilot whales are difficult to differentiate from short-finned pilot whales during aerial and boat surveys, so their exact range in U.S. waters is similarly difficult to determine. However, the available data suggests that long-finned pilot whales are more common along the continental shelf off the northeast coast of the United States during winter and early spring (CeTAP 1982). During late spring through autumn, long-finned pilot whales move into the more northerly waters of Georges Bank and the Gulf of Maine (CeTAP 1982). Some spatial overlap also occurs with short-finned pilot whales in the Mid-Atlantic region between Cape Hatteras, North Carolina, and New Jersey during the summer (Hayes et al. 2018a).

Long-finned pilot whales have stranded along the New York and New Jersey coasts in recent years (Hayes et al. 2018a). Between June 2009 and May 2010, one pilot whale was reported stranded along the coast of Long Island, but it was not identified as either a short-finned or a long-finned pilot whale (RFMRP 2010). During 2013, two pilot whales stranded along the coast of Long Island, but these were not identified as either short-finned or long-finned pilot whales (RFMRP 2014). Based on this information, and the species preference for deeper pelagic and northern waters, this species is unlikely to occur in the vicinity of the Project area during the in-water construction period. Due to their low density, few recorded strandings, and unlikely presence in the Project area, long-finned pilot whales will not be considered further in this analysis.

3.3.9 Common Dolphin

The common dolphin is a species of toothed whale from the Delphinidea family. Common dolphins are smaller than other members of the Delphinidae family. Adult common dolphins reach up to 2.7 meters (9 feet) in length and weigh approximately 200 kilograms (440 pounds) (NOAA Fisheries Service 2015j). Similar to other dolphin species, males can be slightly larger than females. Common dolphins can be identified by their bright colors and distinct patterns (NOAA Fisheries Service 2015j). These patterns include a dark gray, “V” shaped pattern that extends from the rostrum and along the back, a yellow/tan section on the sides, and a white patch on the ventral side that is located forward of the dorsal fin (NOAA Fisheries Service 2015j). They also have a somewhat longer rostrum, a sleek body form, and tall, triangular dorsal fin located along the mid-back (NOAA Fisheries Service 2015j). Common dolphins feed primarily on schooling fish

and cephalopod species that can be found within the top 200 meters (650 feet) of the water column (NOAA Fisheries Service 2015j). Common dolphins are considered mid-frequency cetaceans. The estimated general bandwidth for functional hearing in mid-frequency cetaceans is 150 Hz to 160 kHz (Southall et al. 2007). Common dolphins, like many toothed whales, are very vocal animals, using echolocation for feeding and navigation and vocalizing for socialization (Southall et al. 2007).

3.3.9.1 Numbers

Hayes et al. (2018b) reports that the best abundance estimate for the Western North Atlantic stock of common dolphins, derived from shipboard and aerial surveys in 2011, is 70,184 (CV=0.28). The density estimates used in Transco's analysis predict an abundance of 86,098 (CV=0.12) common dolphins (Roberts et al. 2016).

3.3.9.2 Status

The Western North Atlantic stock of the common dolphin is not categorized as depleted or strategic under the MMPA, is not federally listed as threatened or endangered under the ESA, and is not listed in New York or New Jersey state waters. The status of common dolphins relative to the OSP in the U.S. Atlantic EEZ is unknown (Hayes et al. 2018b).

3.3.9.3 Distribution

The common dolphin is among the most widely distributed cetacean species, occurring throughout the world in temperate and subtropical waters (Hayes et al. 2018b). For management purposes, common dolphins in U.S. waters are divided into two separate stocks, the California/Oregon/Washington stock and the Western North Atlantic stock. Genetic data suggests that the population consists of a single stock within the Western North Atlantic (Luca et al. 2009).

Common dolphins occur worldwide, but the Western North Atlantic stock ranges from Newfoundland to South Carolina (Hayes et al. 2018b). The dolphins occur over the continental shelf along the 100- to 2,000-meter (328- to 6,560-foot) isobaths (Doksaeter et al. 2008). Generally, these dolphins range along the continental slope and are commonly associated with features of the Gulf Stream (Hayes et al. 2018b; Hamazaki 2002). During the CeTAP surveys (1978-1982), this species was observed primarily along the shelf edge and into the deep ocean basin, especially throughout the spring, summer, and winter (CeTAP 1982). Generally, water temperature appears to drive their movements throughout their range. During mid-summer to autumn, common dolphins migrate to Georges Bank and the Scotian Shelf, and during mid-January to May, the dolphins range from Cape Hatteras to Georges Bank (Hain et al. 1981; Payne

et al. 1984). During the summer and autumn, when water temperatures are higher than 11°C, common dolphins generally migrate to the Scotian Shelf and the continental shelf off Newfoundland (Sergeant et al. 1970; Gowans and Whitehead 1995).

Observations made during the CeTAP (1982) surveys indicate that common dolphins occur primarily east and north of Long Island and the Project area during all seasons. The common dolphins observed south of Long Island occurred farther offshore in the deeper water of the continental shelf proper, closer to the continental shelf slope (CeTAP 1982).

Common dolphins have stranded along the New York and New Jersey coasts in recent years. Between 2011 and 2015, 68 common dolphins stranded in New York and 53 stranded in New Jersey (Hayes et al. 2018b). During 2013, 23 common dolphins stranded along the Long Island coast (RFMRP 2014). In 2018, two common dolphin strandings in New Jersey waters were reported (MMSC 2018).

In general, during the winter and early spring, this species occurs in deeper offshore waters, with the majority of observations along the continental slope and into the deep ocean basin. During the summer months, this species occurs in the waters off New England and further north. Consequently, occurrence of the common dolphin would be rare in the vicinity of the Project during the in-water construction period. However, based on the high number of strandings along the Long Island coast, this species may occur within the vicinity of the Project area during the in-water construction period, specifically during winter through early spring.

3.3.10 Short-Finned Pilot Whale

The short-finned pilot whale is one of two species of pilot whales (*Globicephal*a sp.) and is a species of toothed whale from the Delphinidae family. Adult short-finned pilot whales are larger than most members of the Delphinidae family. This species is sexually dimorphic, with males being larger than females (NOAA Fisheries Service 2015k). Adult females can reach up to 3.67 meters (12 feet) in length, and males can reach up to 5.5 meters (18 feet) in length. Adults weigh between 1,000 kilograms and 3,000 kilograms (2,200 pounds and 6,600 pounds) (NOAA Fisheries Service 2015k). The short-finned pilot whale can be identified by its bulbous head, lack of an obvious rostrum, dark black or dark brown body color, and a forward-located, broad-based dorsal fin (NOAA Fisheries Service 2015k). Short-finned pilot whales feed on species that are found mostly in water 305 meters (1,000 feet) or deeper. Their primary prey species is squid; however, they also feed on octopus and fish species (NOAA Fisheries Service 2015k).

Short-finned pilot whales are considered mid-frequency cetaceans. The estimated general bandwidth for functional hearing in mid-frequency cetaceans is 150 Hz to 160 kHz (Southall et al. 2007).

3.3.10.1 Numbers

The best abundance estimate for the Western North Atlantic stock of the short-finned pilot whale is derived from 2011 shipboard and aerial surveys covering waters from central Florida to the lower Bay of Fundy. Based on this information, the abundance estimate was 21,515 (CV=0.37) (Hayes et al. 2018a). This abundance estimate was updated in the NOAA Fisheries Service (2018) U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2018 draft report to 28,924 based on surveys conducted in waters off the northeast and southeast coasts of the U.S. in 2016.

3.3.10.2 Status

The Western North Atlantic stock of the short-finned pilot whale is not considered strategic under the MMPA, is not federally listed as threatened or endangered under the ESA, and is not listed in New York or New Jersey state waters. The status of this stock relative to the OSP in the U.S. Atlantic EEZ is unknown (NOAA Fisheries Service 2018e).

3.3.10.3 Distribution

Short-finned pilot whales are a global species and inhabit tropical and subtropical areas, primarily in deeper waters (NOAA Fisheries Service 2015k). In U.S. waters, they range along both the Atlantic and Pacific coasts. For management purposes, NOAA Fisheries Service has divided short-finned pilot whales in U.S. waters into four stocks. Of those four stocks, only one, the Western North Atlantic stock, occurs along the U.S. East Coast. The Western North Atlantic stock of the short-finned pilot whale ranges primarily along the continental shelf break between New England and Florida. Short-finned pilot whales are difficult to differentiate from long-finned pilot whales during aerial and boat surveys, so it is difficult to determine their exact range. However, the available data suggests that short-finned pilot whales are more common between Florida and North Carolina. There is also some spatial overlap with long-finned pilot whales in the Mid-Atlantic Region between Cape Hatteras, North Carolina, and New Jersey (Hayes et al. 2018a). Because both species prefer deeper offshore waters, they are not often observed in the waters overlying the continental shelf proper and are more commonly seen at the continental shelf break and farther offshore on the slope.

Pilot whales have stranded along the New Jersey coast in recent years. Between 2010 and 2014, no short-finned pilot whales stranded in New York, but two stranded in New Jersey (Hayes et al. 2018a). Between June 2009 and May 2010, one pilot whale was reported stranded along the coast of Long Island, but it was not identified as either a short-finned or a long-finned pilot whale (RFMRP 2010). During 2013, two pilot whales stranded along the coast of Long Island, but these were not identified as either short-finned or long-finned pilot whales (RFMRP 2014). Based on this information, as well as the species' preference for deeper pelagic waters, it is unlikely that this species would occur in the vicinity of the Project area during the in-water construction period. Due to their low density, few recorded strandings, and unlikely presence in the Project area, the short-finned pilot whale will not be considered further in this analysis.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

Because of the large number of marine mammals discussed, Section 3.0 was combined with Section 4.0 in order to consolidate all species-specific information in one place. Each topic required in Section 4.0 (status, distribution, and seasonal distribution [when applicable]) have been identified and addressed in subheadings in Section 3.0 in order to make finding the relevant information easier.

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5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

The type of incidental taking authorization that is being requested (i.e., takes by harassment only, takes by harassment, injury and/or death), and the method of incidental taking.

The MMPA defines "harassment" as "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]" (50 CFR, Part 216, Subpart A, Section 216.3 - Definitions).

Level A is the more severe form of harassment because it may result in injury, whereas Level B results only in disturbance without the potential for injury. After analysis of estimated potential Level A and B take, this IHA application is requesting takes resulting from Level A injury for gray and harbor seals and Level B acoustical harassment for gray seal, harbor seal, harp seal, fin whale, humpback whale, minke whale, North Atlantic right whale, bottlenose dolphin, common dolphin, and harbor porpoise.

Incidental Take Authorization Request and Method of Incidental Taking

Transco requests the issuance of an IHA pursuant to Section 101(a)(5) of the MMPA for the incidental Level A take (injury due to Level A harassment) of small numbers of two marine mammal species and Level B take (behavioral harassment due to Level B harassment) of small numbers of 10 marine mammal species by impact and vibratory pile installation and removal activities during the summer of 2020, as described in this application. This activity is associated with the construction of a subsea pipeline offshore of New York and New Jersey in the New York Bight region. To allow flexibility in scheduling, actual pile installation and removal activities are expected to take 68.5 days during a 10- to 12-week period between June and August 2020. However, removal activities have the potential to shift into the months of September, October, and November. Transco has used the most conservative take estimates calculated between the two removal scenarios for this authorization request to account for any shifts in pile removal from the anticipated schedule.

The activities outlined in Section 1.0 have the potential to take marine mammals by injury and acoustic behavioral harassment during impact and vibratory pile installation and removal activities. More specifically, the requested authorization is for the incidental harassment of two

species of marine mammals that might enter Level A ensonified areas during the installation phase of construction and 10 species of marine mammals that might enter Level B ensonified areas during all phases of construction activities. Modeled Level A and Level B isopleths were calculated using NOAA Fisheries Service's 2018 acoustic guidance, and the results were used to determine the number of takes requested for the 10 marine mammals listed in Table 11. (Section 6 presents a description of the calculations).

Table 11
Number of Takes Requested per Species

Species	Stock	Number of Level A Takes Requested	Number of Level B Takes Requested
Pinnipeds			
Gray Seal	Western North Atlantic	7	826
Harbor Seal	Western North Atlantic	16	1,780
Harp Seal[a]	Western North Atlantic	0	4
Cetaceans			
Whales			
Fin Whale[b]	Western North Atlantic	0	5
Humpback Whale[b,c]	Gulf of Maine	0	30
Minke Whale[b]	Canadian East Coast	0	1
North Atlantic Right Whale	Western Atlantic	0	2
Dolphins and Porpoises			
Bottlenose Dolphin	Western North Atlantic Coastal and Offshore	0	6,331
Common Dolphin	Western North Atlantic	0	95
Harbor Porpoise	Gulf of Maine/Bay of Fundy	0	11

Notes:

[a] NOAA does not provide density estimates for the U.S. population of harp seals. Stranding data suggest that harp seals may be within or near the Project Area; therefore, Level B takes are being requested.

[b] Removal take estimates for fin whales, humpback whales, and minke whales represent the fall removal schedule rather than summer in order to capture the most conservative take numbers.

[c] Additional Level B take for humpback whales are being requested based on anecdotal sighting data within or near the Project Area during the proposed construction period.

6 NUMBER OF MARINE MAMMALS THAT MAY BE AFFECTED

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.

This section summarizes the methods for evaluating the number of marine mammals that are expected to be incidentally harassed during impact and vibratory pile installation and removal activities associated with Transco's proposed Project, described in Section 1.0. Section 6.1 discusses choosing representative pile locations. Section 6.2 discusses developing a viewshed. Section 6.3 discusses calculating ensonified areas (ZOIs). Section 6.4 discusses applying densities of species and calculating take estimates. Geographic information system (GIS) techniques and a custom Python script (a small set of coded instructions written in the Python programming language) was developed and used to assist in the methods and calculations.

Pile installation and removal activities discussed in this IHA application may result in Level A injury of small numbers of gray and harbor seals, and Level B acoustical behavioral harassment (if the sound is audible above local background noise) of small numbers of the following species: gray seal, harbor seal, harp seal, humpback whale, fin whale, minke whale, North Atlantic right whale, bottlenose dolphin, common dolphin, and harbor porpoise.

6.1 Determining Representative Pile Locations

The Transco Project would involve the use of piles of various sizes along a string of locations within Raritan Bay. Since there would be many piles at each of the construction sites within close proximately to each other, it was not practical to develop ZOIs for each individual pile. The results would be nearly identical for every similarly sized pile at that construction location. In order to simplify calculations, a representative pile site was chosen for eight pile locations (Figure 8). For the HDD Morgan Offshore string site, the representative pile location was chosen passed the exit point, closest to the platform installation, which represents the area with the largest pile sizes. For strings where only a single pile type would be installed or removed (i.e., Neptune Power Cable Crossing MP13.84 and MP35.04, MP14.5 to MP16.5, MP28.0 to MP29.36, and MP34.5 to MP35.04), the representative pile location was chosen in the middle of the string.

Lastly, the HDD Ambrose West and East Side representative pile locations were chosen based on the entry and exit pits. The HDD Ambrose East Side is the entry pit and the HDD Ambrose West Side is the exit pit. This also represents the outer limit of the HDD Ambrose string, and is therefore the most conservative modeling option.

6.2 Viewshed Analysis

Viewshed analysis is a standard technique used in GIS to determine whether an area is visible from a specific location (Kim et al. 2004). The analysis uses an elevation value of two points with direct 'line of sight' to determine the likelihood of seeing the elevated point from the ground. Incorporating the viewshed analysis allowed GIS modeling of sound propagation to replicate how sound waves traveling through the water are truncated when they encounter land (Figure 9). GIS modeling used an artificial elevation model setting the water to zero (ground) and any land mass to 100 (elevated point) and focusing only on areas within the Project area where sound would propagate. Any land within direct 'line of sight' to the sound source would prevent the sound from propagating farther.

Figure 9 shows an example of applying the viewshed analysis to a single representative pile location (HDD Morgan Offshore). Everything in gray represents the area where sound would propagate based on the land contour. This method was applied to each of the eight representative pile locations. This simple model does not account for diffusion, which would be minimal with large landmasses; therefore in the model no sound bends around landmasses. A similar approach has been used in previous authorized IHAs (Navy 2016).

6.3 Estimating Zone of Influence (ZOI)

Acoustic isopleths to the various Level A and Level B potential impact thresholds were calculated for each pile size for vibratory and impact installation and removal activities at the representative pile locations within the Project area, as described in Section 1.6. GIS analysis then used these values to calculate the resulting ZOIs (i.e., the area ensonified by noise levels at or greater than the threshold) and determine species density estimations for those ZOIs.

NEW YORK

Union

Middlesex

Richmond

Kings

Jamaica Bay

Queens

Nassau

Lower Bay

Rockaway Delivery Lateral

MP 35.49

MP 35

MP 34

MP 33

MP 32

MP 31

MP 30

MP 29

MP 28

MP 27

MP 26

MP 25

MP 24

MP 23

MP 22

MP 21

MP 20

MP 19

MP 18

MP 17

MP 16

MP 15

MP 14

MP 13

MP 12

New York

New Jersey

Neptune Power Cable Crossing (MP35.04)

MP34.5 to MP35.04

HDD Ambrose East Side

HDD Ambrose West Side

MP28.0 to MP29.36

MP14.5 to MP16.5

Raritan Bay

Neptune Power Cable Crossing (MP13.84)

HDD Morgan Offshore

Atlantic Ocean

Sandy Hook Bay

State Waters Limit

Monmouth

NEW JERSEY

Representative Pile Location

Milepost

Proposed Pipeline

Rockaway Delivery Lateral

Neptune Transmission Cable

County Boundary

NY/NJ Boundary

Maintained Navigation Channel

Anchorage Area

N

0 1 2 Miles

0 2 4 Kilometers

1:130,000

NOTES

SITE LOCATION

White Plains

Stamford

Paterson

Yonkers

Parsippany

Hicksville

Brentwood

Elizabeth

New York

Levittown

West Babylon

Edison

Raritan Bay Loop

Long Branch

Trenton

Philadelphia

Toms River

FIGURE 8

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

REPRESENTATIVE PILE LOCATIONS

RARITAN BAY LOOP

NORTHEAST SUPPLY ENHANCEMENT PROJECT

NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

Date: 6/18/2018 L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\IHA\2018_06_18\Fig08_PileLocations_20180618.mxd

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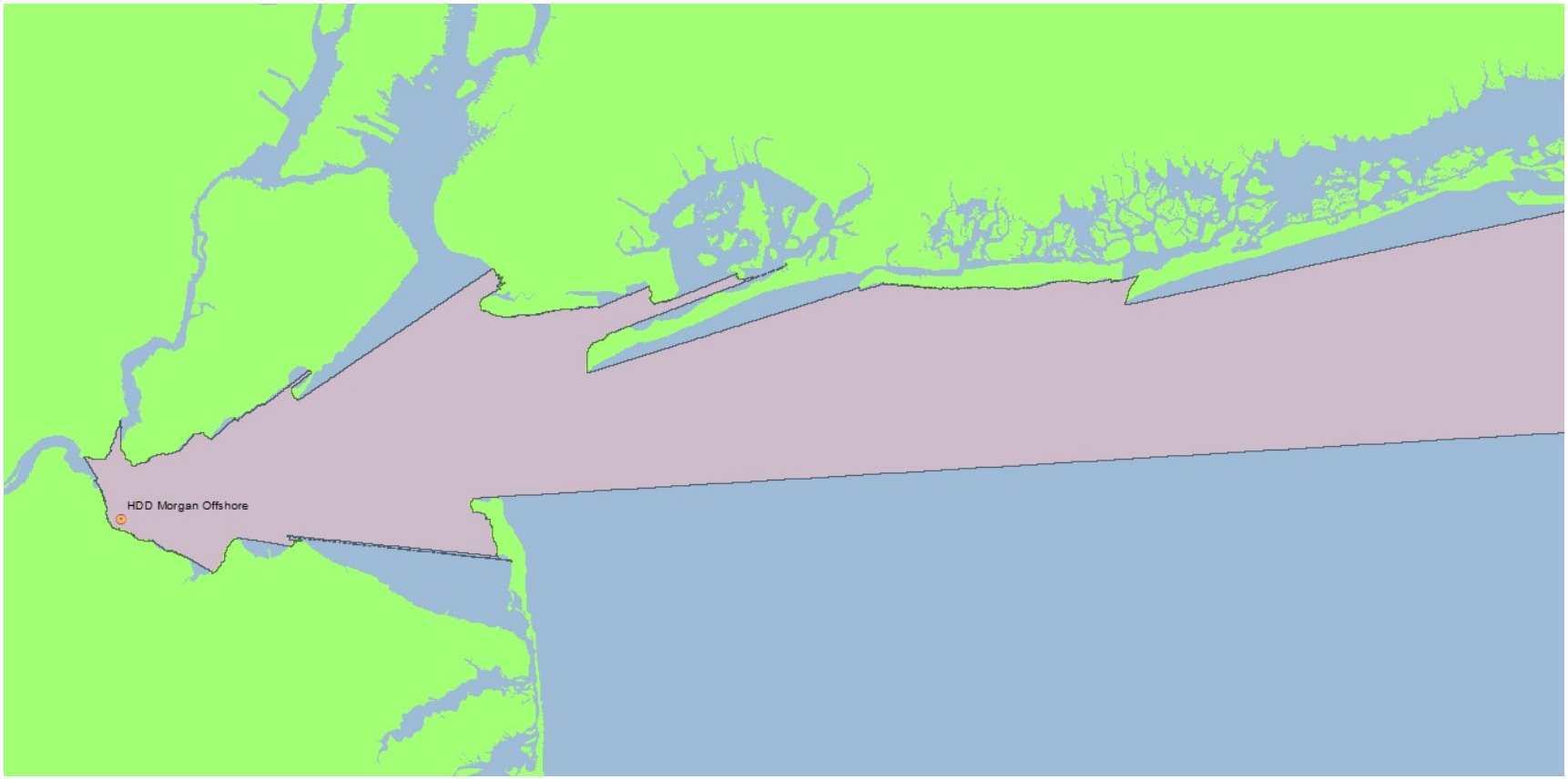

Figure 9 Example of using a viewshed analysis within the Project Area

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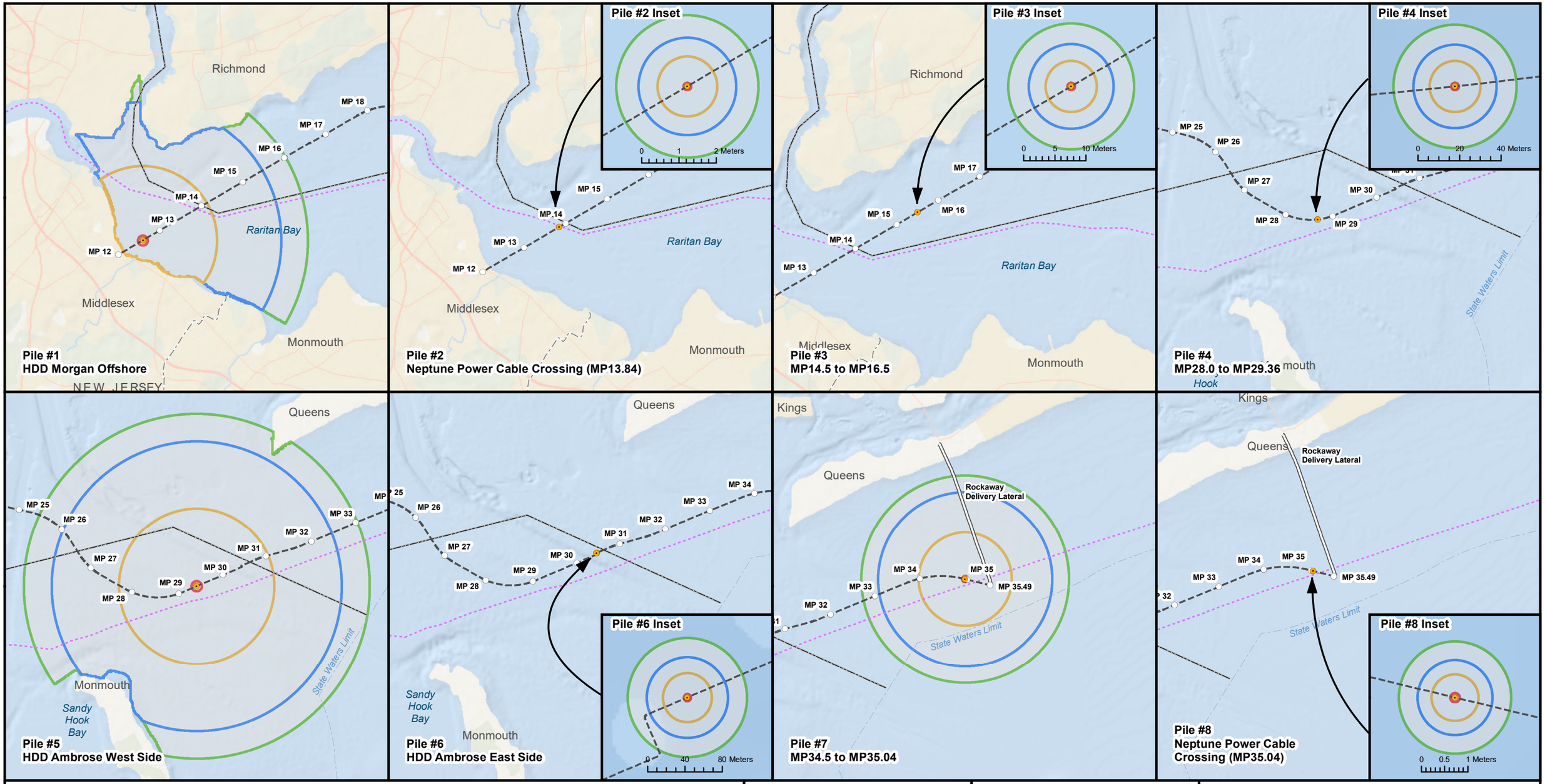
The modeled Level A ZOIs are shown on Figure 10 (pile installation) and Figure 12 (pile removal). The maps depict the maximum modeled ZOI at each representative pile location (either vibratory or impact, whichever was largest) for low-frequency, mid-frequency, high-frequency and phocid thresholds based on the NOAA Fisheries Service criteria described in Section 1.6.5.

The Level B ZOIs for activities in the Project area are shown on Figure 11 and Figure 13. Each representative pile shows the maximum ZOI (either vibratory or impact, whichever was largest) based on the Level B thresholds. The NOAA 2018 technical guidance implements a 120 dB noise level threshold for vibratory pile driving for Level B harassment of marine mammals and a 160 dB noise level threshold for impact pile driving. For the Project, the maximum modeled distance to reach ambient noise levels of 120 dB is 21,544 meters (14 statute miles) for vibratory pile driving and the maximum modeled distance to reach the ambient noise level of 160 dB is 2,154 meters (1.3 statute miles) for the 60-inch steel pile. As stated in Section 1.6.2, the Port of New York and New Jersey is the third busiest port in the United States. Transco anticipates that the sound generated from vibratory pile driving would be masked at a distance much shorter than 21,544 kilometers (14 statute miles) due to the amount of vessel traffic throughout the Project area. Several studies conducted on ambient noise and vibratory pile-driving activities indicate that ambient noise levels of a project area depend on the amount of vessel traffic in the surrounding area (Merchant et al. 2012; NAVFAC SW 2017). Merchant et al. (2012) conducted an ambient noise study at the western entrance to the English Channel in Falmouth Bay. The Channel is one of the busiest waterways in the world, which could be representative of the Transco Project area. Merchant et al. (2012) found that intermittent ambient sound pressure reached up to 148.6 dB due to multiple ships traveling through the area. This study demonstrates that even “ambient” noise levels in a project area can vary because of existing anthropogenic noise in the environment. Another example of masking project noise by existing ambient noise was observed during the Fuel Pier Replacement Project at Naval Base Point Loma in San Diego, California (NAVFAC SW 2017). For example, in 2017, sound pressure levels recorded at distances between 537 meters and 810 meters (1,762 feet and 2,657 feet) were 7 to 8 dB higher than those recorded at 250 meters (820 feet) during demolition of 2.1-meter (84-inch) caisson piles. The results demonstrated that determining the 120 dB level threshold can be difficult in an already noisy environment. However, Transco has conservatively requested Level B take based on the entire modeled Level B ensonified area.

6.4 Species Density

Density estimates for marine mammals in the coastal Mid-Atlantic region are limited, and there are no density estimates for the specific Project area in the New York Bight region. Therefore, estimated takes for cetaceans were calculated based on the best available information for the region, which includes density estimates developed by Duke University through its Habitat-Based Cetacean Density Models (Roberts et al. 2016; Roberts et al. n.d. [unpublished data used only for North Atlantic right whale densities]). Cetacean density models included approximately 24 years of survey data and modeled distributions based on habitat preferences. For each cetacean species, density data for summer (June – August) and fall (September, October, November) were used to generate source grids by averaging monthly densities (Figure 15). Since the source density grids do not extend to Raritan Bay, the grid was extrapolated to cover the bay and values were pulled from the nearest grid cell to assign density values to those empty cells in order to approximate densities in Raritan Bay (Figure 16). The resulting density grid was used to calculate take estimates of marine mammals for pile installation and removal activities (Section 6.5).

For harbor seals and gray seals, densities were first obtained from OBIS SEAMAP Strategic Environmental Research & Development Program NODES models (Navy OPAREA Density Estimates) (Halpin et al. 2009; Navy 2007, 2012). During initial consultations with NOAA Fisheries, it was determined that the NODES models no longer represent the best available science, and the densities were re-evaluated using Duke University's updated habitat-based density models for pinnipeds in the Mid-Atlantic (Roberts et al. 2018). Because the data used in the Roberts et al. (2018) density models were derived from offshore aerial and vessel surveys, the models did not accurately represent densities of pinnipeds in Raritan Bay, which occur nearshore and thus might have been underrepresented in the surveys. This resulted in take estimations that were not consistent with expectations based on the number of opportunistic sightings reported in the Project area. There have been no systematic studies focusing on seal populations within Raritan Bay, Lower New York Bay, or Sandy Hook Bay. The best available data closest to the Project area comes from citizen science counts within Sandy Hook Bay conducted by Save Coastal Wildlife (SCW 2019). Because SCS 2019 conducted only 24 surveys over a period of 10 years, a daily density was calculated using systematic data collected by CRESLI from November 18, 2018, to April 16, 2019, at Cupsogue Beach Park (CRESLI 2019) (see Section 6.5.1).



- Representative Pile Location
- Maximum Low Frequency ZOI
- Maximum Mid Frequency ZOI
- Maximum High Frequency ZOI
- Maximum Phocid ZOI
- Milepost
- Proposed Pipeline
- Neptune Transmission Cable
- County Boundary
- NY/NJ Boundary

N

0 1 2 Miles

0 1 2 3 Kilometers

1:125,000

NOTES

1. For modeling purposes, a representative pile location was selected for each construction site that will require installation of temporary piles. In instances where there would be a longer span of piles installed, a mid-point was selected.

2. The maximum ZOI for each sound group is shown for each location, and considers both vibratory and impact installation methods.

SITE LOCATION

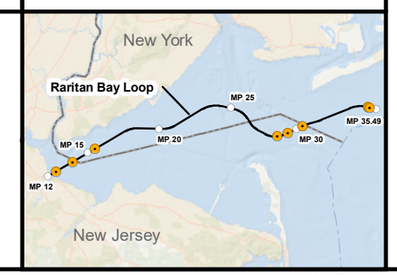


FIGURE 10
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
LEVEL A - INSTALLATION
ZOIs FOR REPRESENTATIVE PILES
RARITAN BAY LOOP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

Date: 1/15/2019 L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\IHA\2019_01_14\Fig10_Install_Cum_Level_A_insets20190114.mxd

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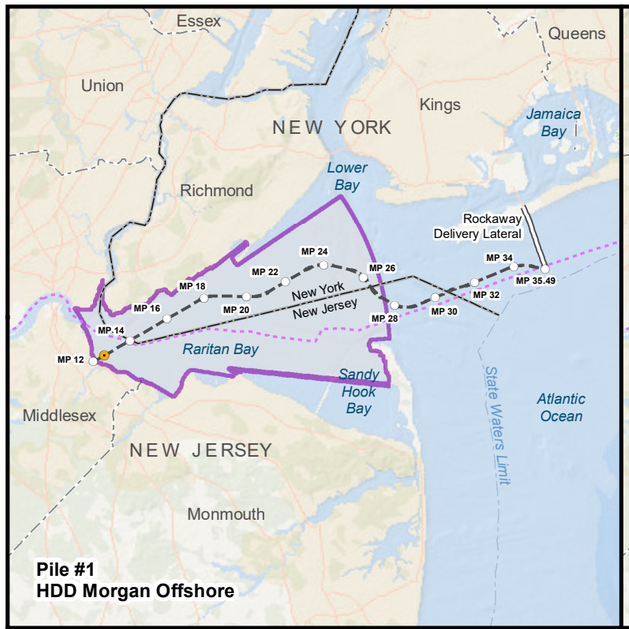
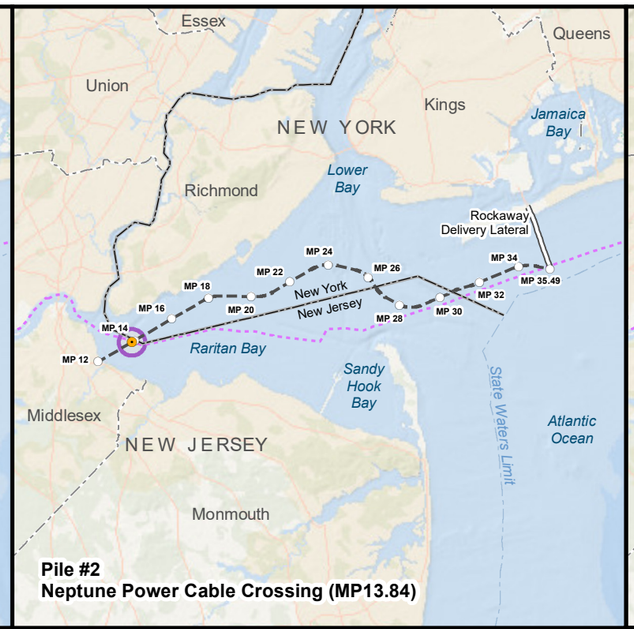
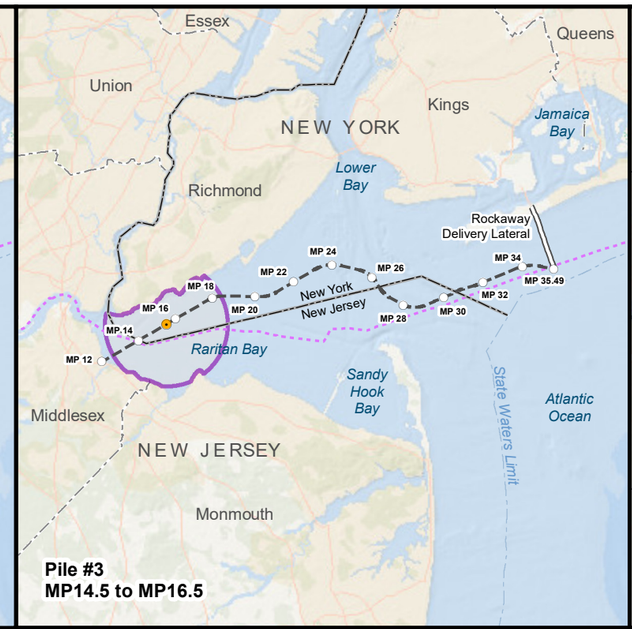


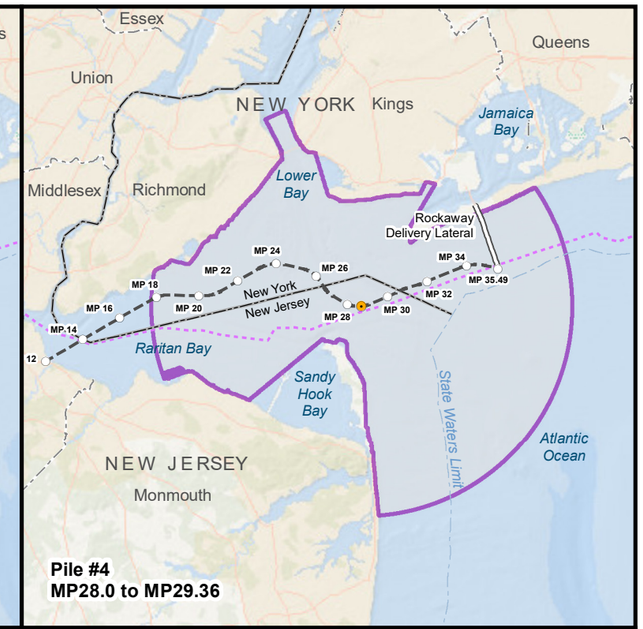
Pile #1
HDD Morgan Offshore



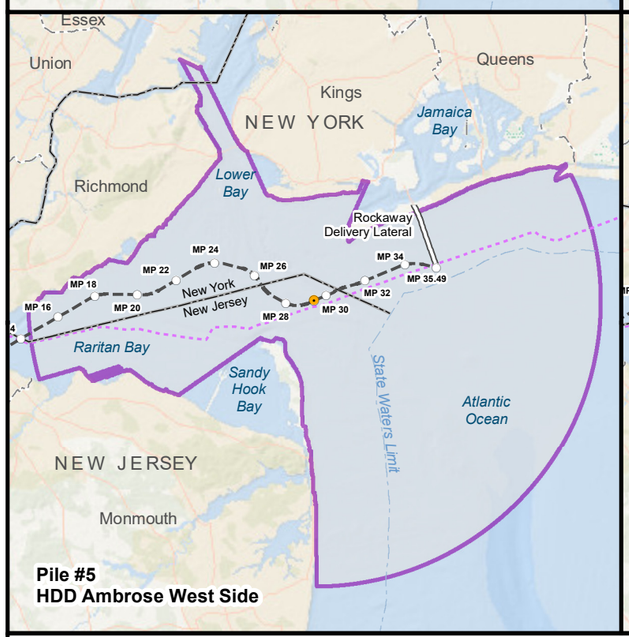
Pile #2
Neptune Power Cable Crossing (MP13.84)



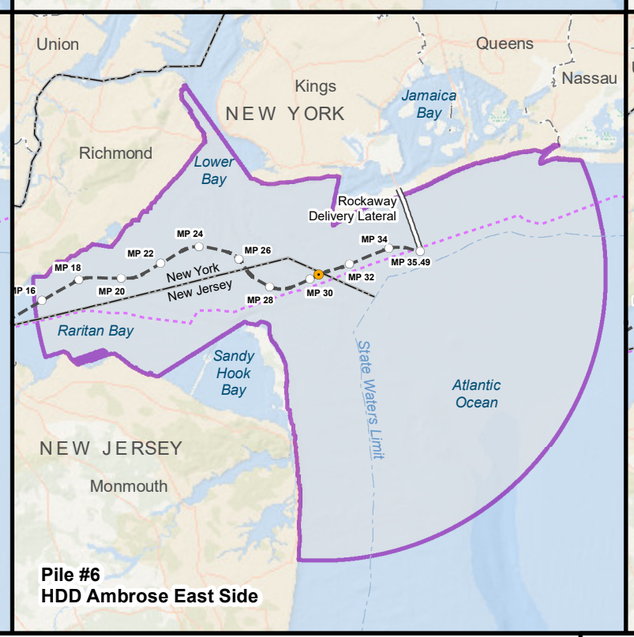
Pile #3
MP14.5 to MP16.5



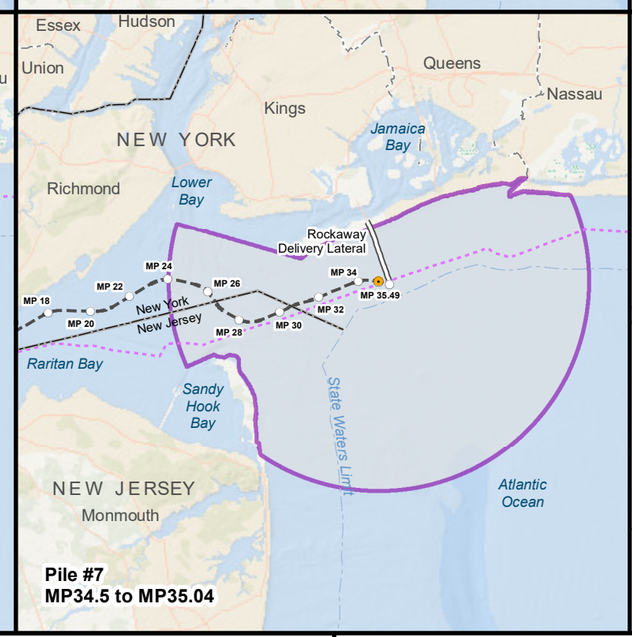
Pile #4
MP28.0 to MP29.36



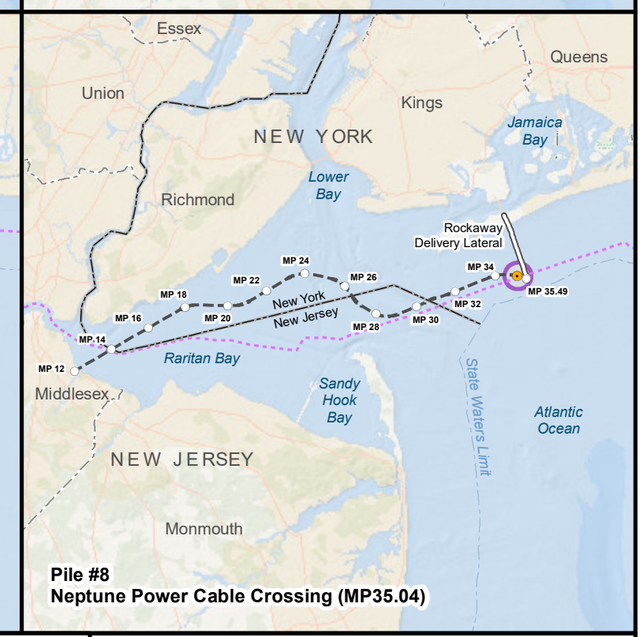
Pile #5
HDD Ambrose West Side



Pile #6
HDD Ambrose East Side



Pile #7
MP34.5 to MP35.04



Pile #8
Neptune Power Cable Crossing (MP35.04)

- Representative Pile Location
- Maximum Level B ZOI
- Milepost
- Proposed Pipeline
- Neptune Transmission Cable
- County Boundary
- NY/NJ Boundary

N

0 2 4 6 8 Miles

0 4 8 12 Kilometers

1:450,000

NOTES

1. For modeling purposes, a representative pile location was selected for each construction site that will require installation of temporary piles. In instances where there would be a longer span of piles installed, a mid-point was selected.

2. The maximum ZOI for each sound group is shown for each location, and considers both vibratory and impact installation methods.

SITE LOCATION

FIGURE 11
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
LEVEL B - INSTALLATION
ZOI FOR REPRESENTATIVE PILES
RARITAN BAY LOOP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

Date: 1/16/2019 L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\IHA\2019_01_14\Fig11_Install_Cum_Level_B_20190114.mxd

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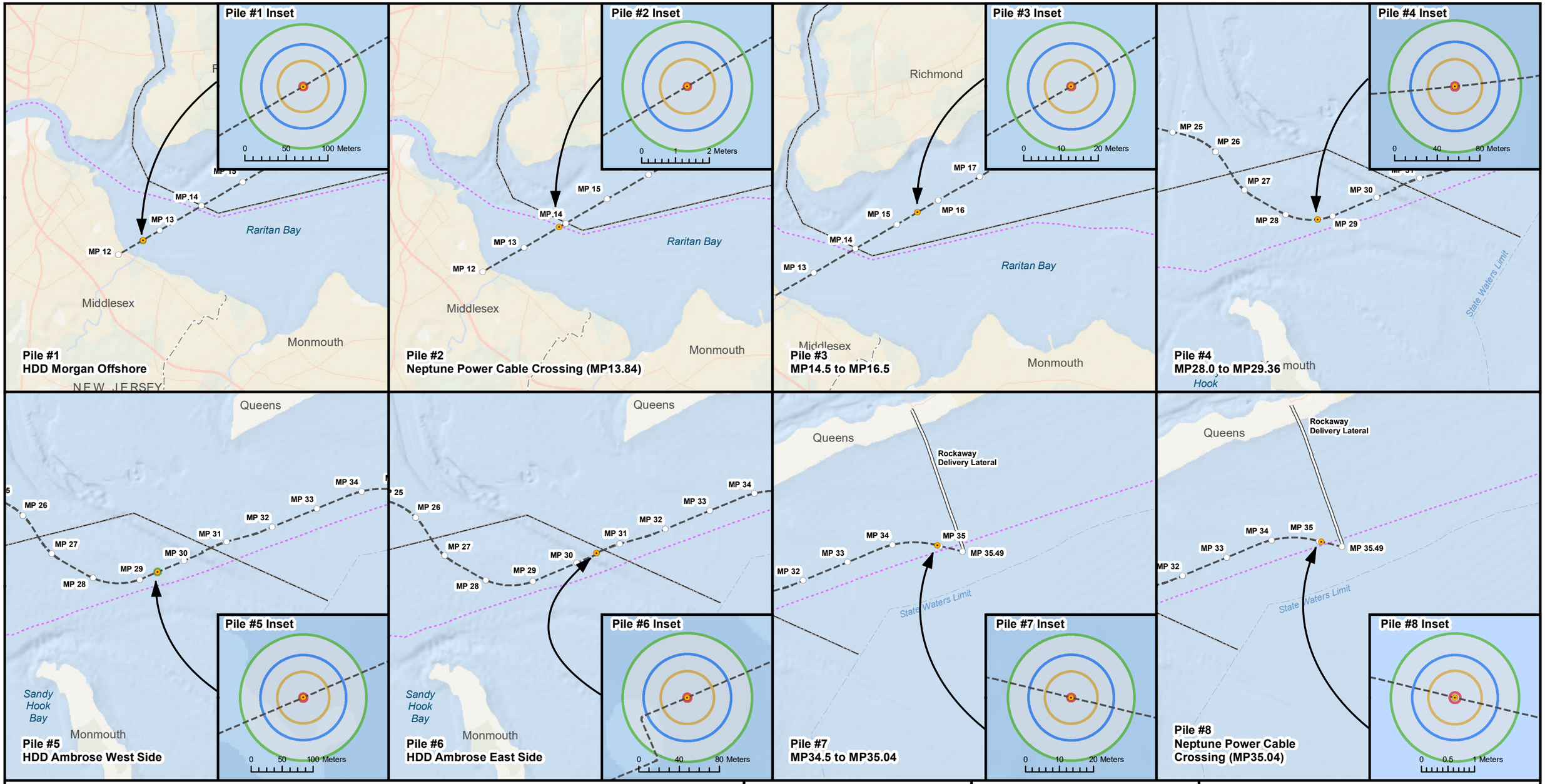

- Representative Pile Location
- Maximum Low Frequency ZOI
- Maximum Mid Frequency ZOI
- Maximum High Frequency ZOI
- Maximum Phocid ZOI
- Milepost
- Proposed Pipeline
- Neptune Transmission Cable
- County Boundary
- NY/NJ Boundary

N

0 1 2 Miles

0 1 2 3 Kilometers

1:125,000

NOTES

1. For modeling purposes, a representative pile location was selected for each construction site that will require removal of temporary piles. In instances where there would be a longer span of piles removed, a mid-point was selected.

2. The maximum ZOI for each sound group is shown for each location.

SITE LOCATION

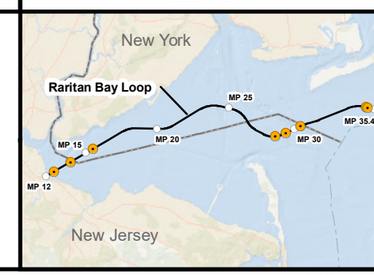

FIGURE 12
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
LEVEL A - REMOVAL
ZOIs FOR REPRESENTATIVE PILES
RARITAN BAY LOOP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

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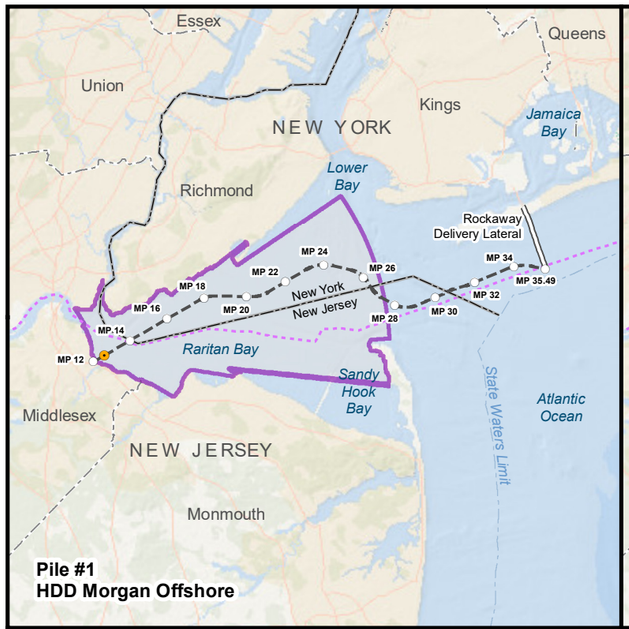
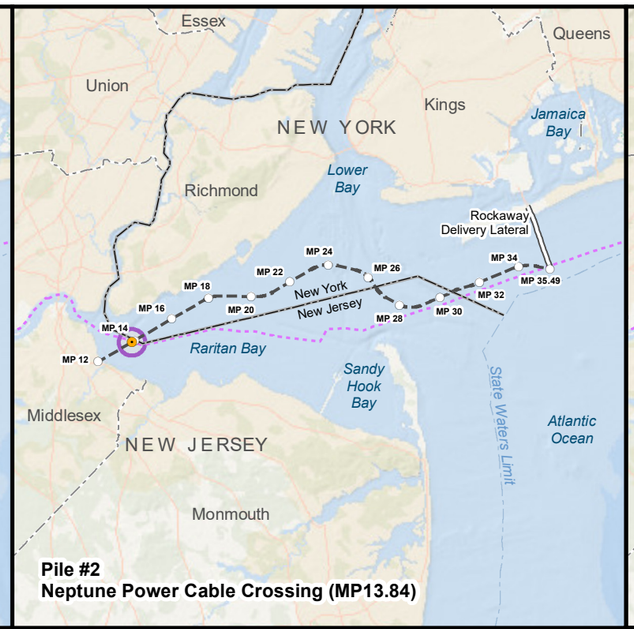
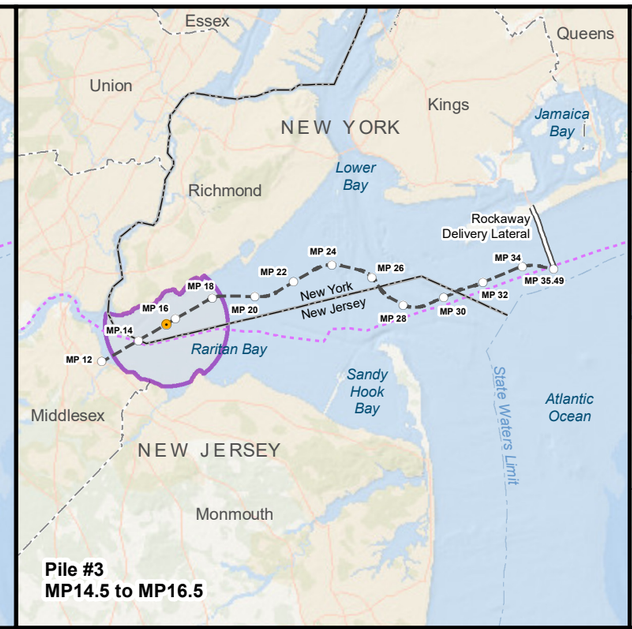


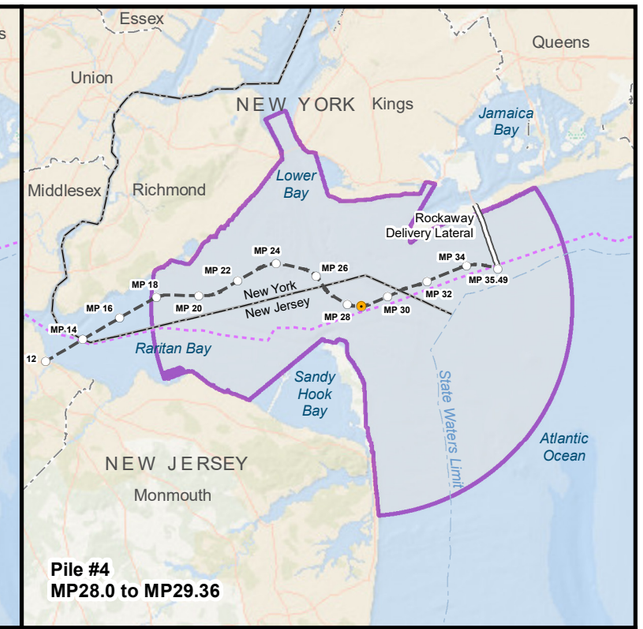
Pile #1
HDD Morgan Offshore



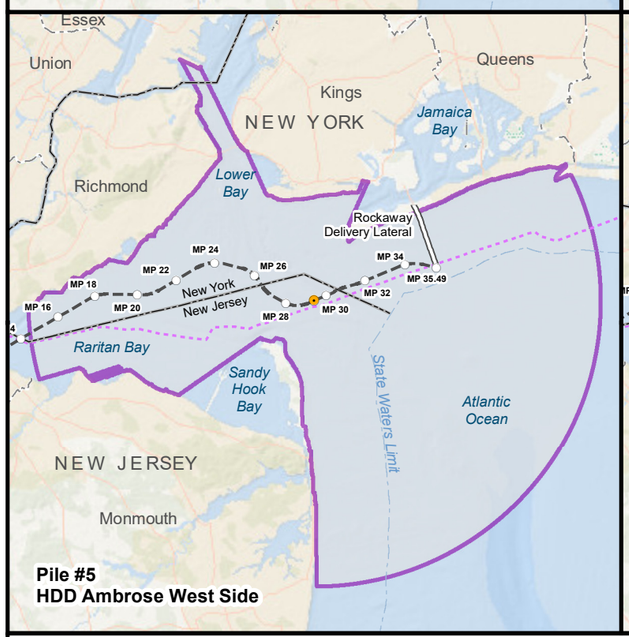
Pile #2
Neptune Power Cable Crossing (MP13.84)



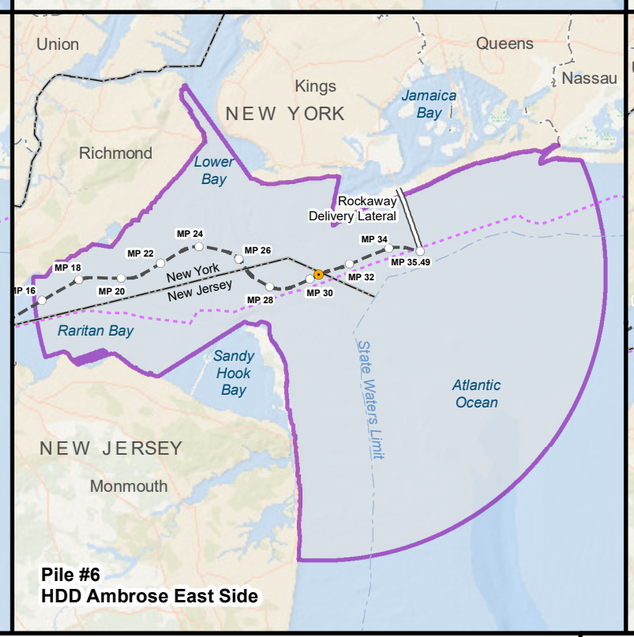
Pile #3
MP14.5 to MP16.5



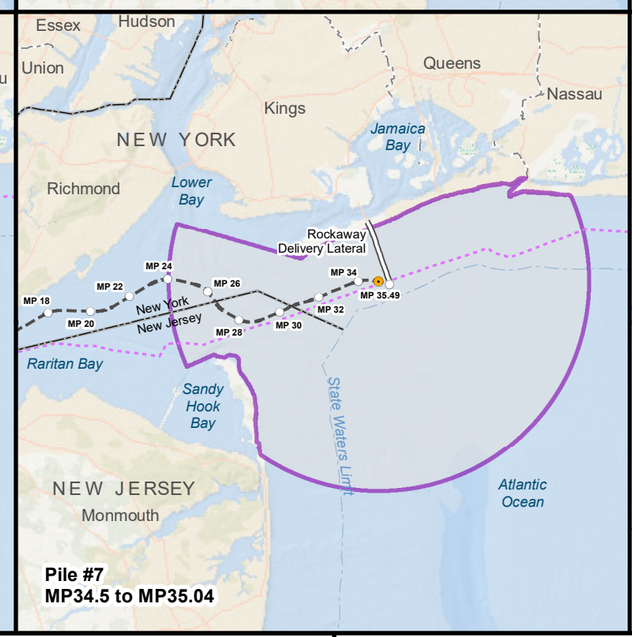
Pile #4
MP28.0 to MP29.36



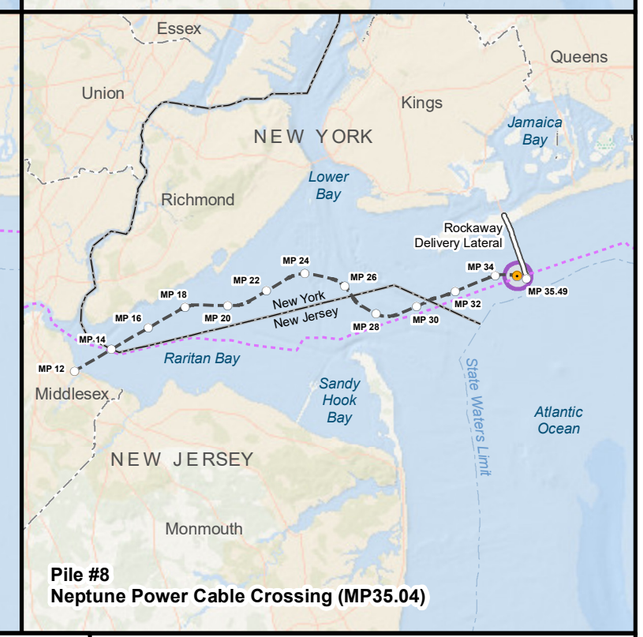
Pile #5
HDD Ambrose West Side



Pile #6
HDD Ambrose East Side



Pile #7
MP34.5 to MP35.04



Pile #8
Neptune Power Cable Crossing (MP35.04)

- Representative Pile Location
- Maximum Level B ZOI
- Milepost
- Proposed Pipeline
- Neptune Transmission Cable
- County Boundary
- NY/NJ Boundary

N

0 2 4 6 8 Miles

0 4 8 12 Kilometers

1:450,000

NOTES

1. For modeling purposes, a representative pile location was selected for each construction site that will require removal of temporary piles. In instances where there would be a longer span of piles removed, a mid-point was selected.

2. The maximum ZOI for each sound group is shown for each location.

SITE LOCATION

FIGURE 13
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
LEVEL B - REMOVAL
ZOI FOR REPRESENTATIVE PILES
RARITAN BAY LOOP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

Date: 1/17/2019 L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\HA\2019_01_14\Fig13_Removal_Cum_Level_B_20190114.mxd

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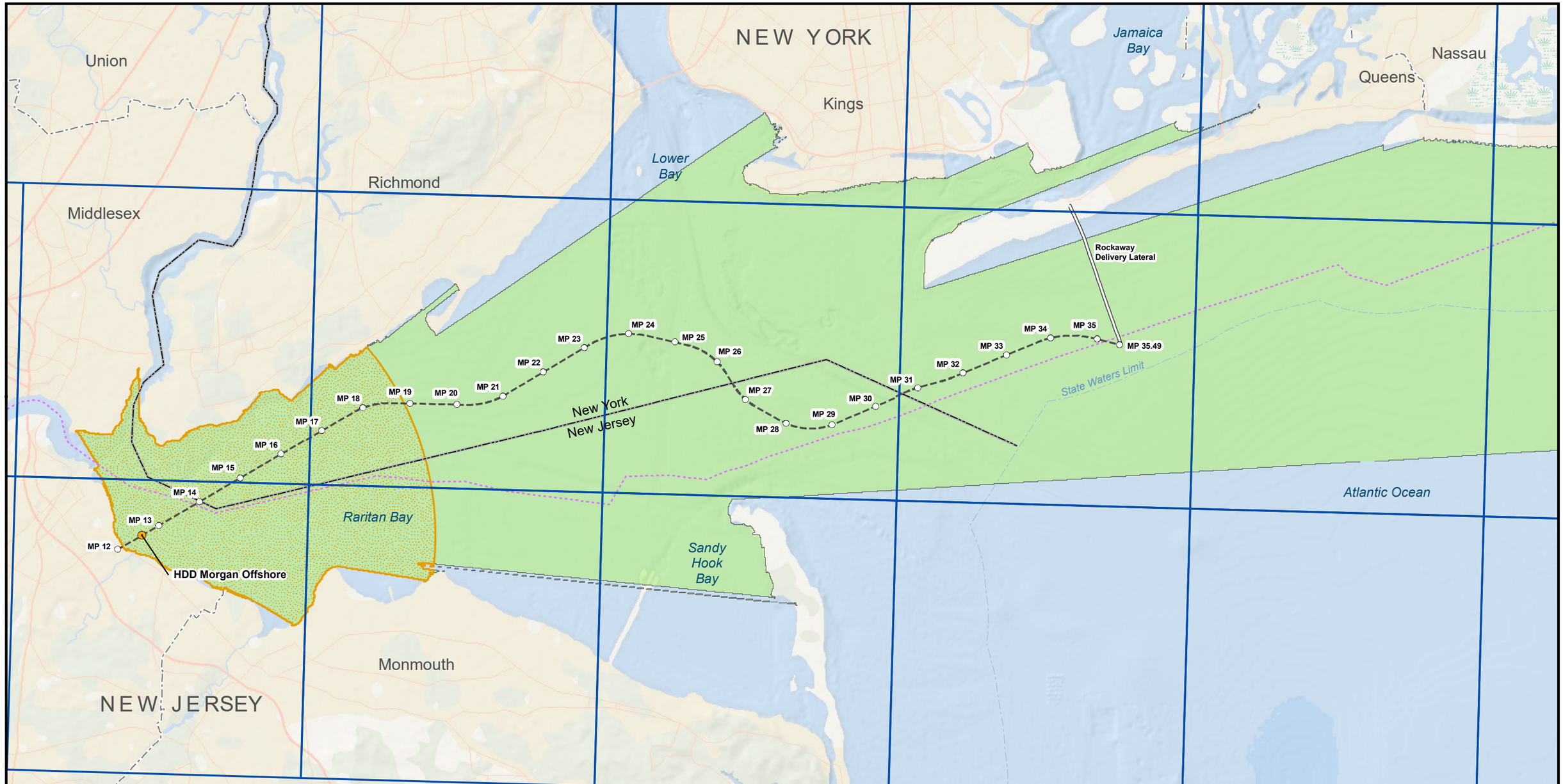

Representative Pile Location
Modeled Isopleth ZOI
Viewshed of Pile location
Marine Mammal Density Grid (Expanded for Analysis)

Milepost
Proposed Pipeline
Rockaway Delivery Lateral
Neptune Transmission Cable
County Boundary
NY/NJ Boundary

N

0 1 2 3 Miles

0 2 4 Kilometers

1:130,000

NOTES

SITE LOCATION

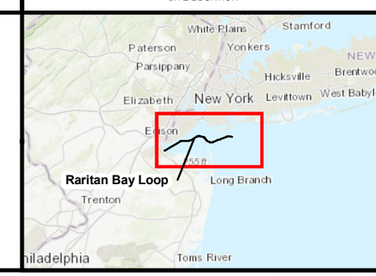

FIGURE 14
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
ZOI AND VIEWSHED
HDD MORGAN OFFSHORE REPRESENTATIVE PILE
RARITAN BAY LOOP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

Data Sources: Williams 2017; E&E 2018; ESRI 2012, 2017; NOAA 2011.

Date: 6/19/2018 L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\IHA\2018_06_18\Fig14_ExampleViewshedClip_Pile01_20180618.mxd

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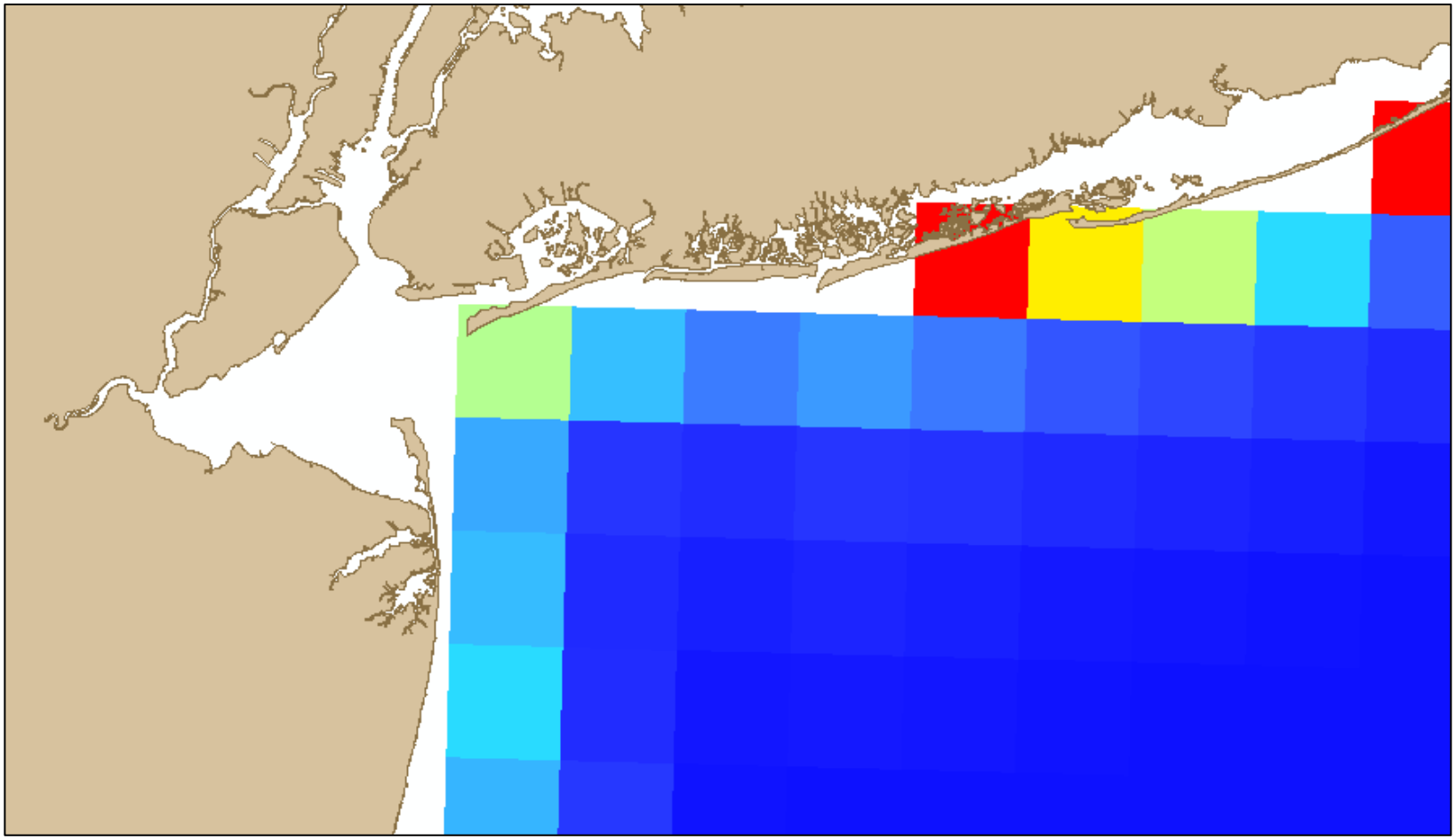

Figure 15 Example of the source density grid for summer used to calculate densities for bottlenose dolphins.

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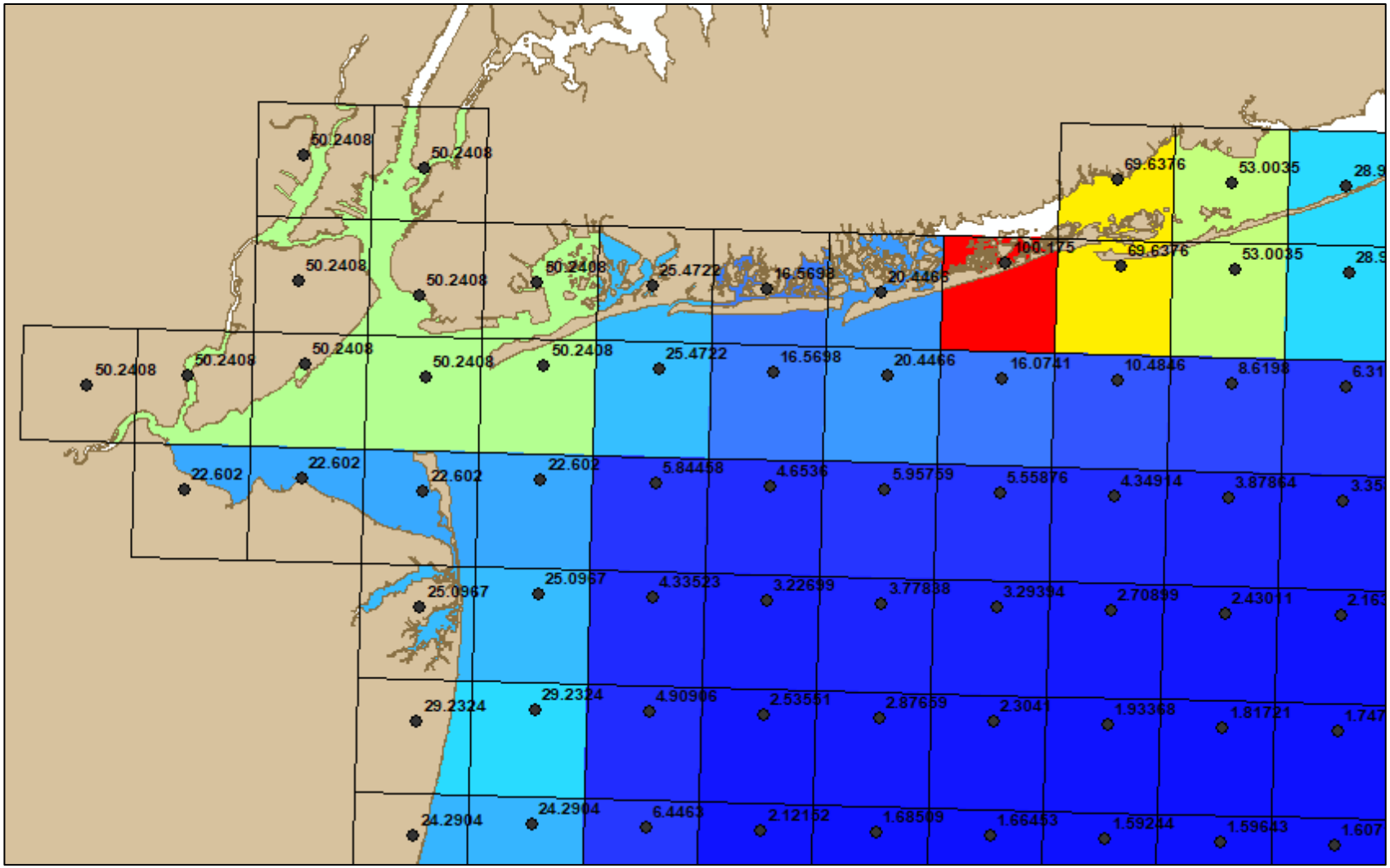

Figure 16 Updated summer density grid for bottlenose dolphins based on extrapolation from original data. Each grid cell includes average density value for that cell.

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6.5 Calculating Take Estimates

The take calculations presented in this IHA relied on the best available population density estimates within close proximity to the Project area (Section 6.4). Potential takes were calculated for Level A and Level B for each of the 10 species likely to be found in the vicinity of the Project area during the in-water construction period. Transco calculated take estimates for two scenarios: (1) all construction activities occurring during summer 2020, and (2) installation occurring during the summer and removal in fall 2020. To date, the construction schedule has not been finalized; therefore, Transco has used the most conservative take estimates calculated between the two scenarios for this authorization request. The calculated number of takes by harassment presented here are overly conservative numbers based on a variety of factors, including the following:

- The conservative ZOI (as described in Section 6.3).
- The density estimates assume even distribution throughout grid-cells and are largely derived from adjacent grid-cells that likely overestimate density in the vicinity of the Project area.
- The density values used in the take calculations account for entire grid-cell density values, even if the species-specific ZOI overlapped a small portion of the grid-cell.
- Pinniped densities assume all individuals in the population are in the water at any given time.

Therefore, Transco expects that the actual number of individual animals being exposed to harassment levels of sound would be far less than the number of take authorizations requested. Additionally, the sound produced by the pile installation or removal devices may not be fully audible to these species due to the local background noise, which is likely to be dominated by loud, low-frequency commercial vessel noise (see Sections 1.6.2 and 6.3).

6.5.1 Method for Calculating Take Estimates

A custom Python script was developed to calculate potential cetacean takes due to pile installation and removal activities. The script overlays the species-specific Level A and Level B ZOIs (each clipped by the viewshed [Figure 9] for each pile size and type at each of the representative pile locations, over the density grid cells (Table 12). The script then multiplies the total density value by the area of the ZOI, resulting in initial take estimate outputs. The following formulas were implemented by the script for each species at each representative pile location:

Initial Level A take estimate = ZOI * d

Initial Level B take estimate = ZOI * d

where:

ZOI = the ensonified area at or above the species-specific acoustic threshold, clipped by the viewshed

d = density estimate for each species within the ZOI

The initial take estimates are multiplied by the duration (days) of the corresponding in-water construction activity (based on pile size and location) (see Table 2). The following formulas demonstrate this method:

Level A take estimate = initial take estimate * X days of activity

Level B take estimate = initial take estimate * X days of activity

where:

X days of activity = number of days for which the corresponding in-water construction activity occurs.

These numbers are totaled for each species to result in the final Level A and Level B take estimates for installation and removal of piles. These numbers, which were rounded to the nearest whole individual, rounding down if the value ended in less than 0.5 or up if the number ended equal or greater than 0.5, are presented in Table 12. For humpback whales, where there are confirmed anecdotal sightings within or near the Project Area, other methods for calculating Level B take were applied. Transco used sighting data presented by Brown et al. (2018b), which reported 617 sightings of humpback whales within the New York Bight from 2011 to 2017. Transco used the total number of sightings, divided by the total number of years (n = 6), divided by 12 months (to get total number of whales per month), and lastly multiplied by a conservative number of months of pile driving and removal activities (n = 4). Using this approach, Transco expects that the actual calculated take could exceed the modeled take estimates and is requesting a conservative number of Level B take (n = 34) in this authorization permit (see Section 6.5.2).

Harbor seal take estimates were calculated using systematic data collected by CRESLI from November 18, 2018, to April 16, 2019, where a total of 2,689 harbor seals were sighted at Cupsogue Beach Park. Transco used the total number of sightings divided by the total number of survey months (n = 5) to get total number of seals per month, and multiplied by a conservative

number of months of pile driving and removal activities (n = 4). Using this approach, Transco calculated a total of 2,151 individuals likely to occur during the duration of construction activities. Data on gray seals in the Project area is limited; therefore, Transco took the ratio of harbor seals (64%) versus gray seals (36%) calculated from the original NODES data, applied that ratio to the total number of harbor seals (n = 2,151), and calculated take estimates for both species during all phases of the Project. Based on this approach, Transco is requesting revised estimates of Level B take for 1,377 harbor seals (= 2,151*0.64) and 774 gray seals (= 2,151*0.36). To calculate Level A take, Transco used the ratio of Level A relative to Level B takes from the earlier take estimates calculated using the original NODES data. Those take estimates accounted for the spatial extent of potential exposure to noise that could result in Level A and B take since they were based on the ensonifed areas multiplied by the NODES densities. Therefore, an estimation of the potential exposure of pinnipeds to Level A noise as a proportion of potential exposure of pinnipeds to Level B noise could be determined and used to calculate a reasonable estimate of Level A takes using the new Level B take estimates. Transco determined that ratio to be 0.009 for harbor seals and 0.008 for gray seals; therefore, Transco is requesting revised estimates of Level A take for 12 harbor seals (=1,377*0.009) and 6 gray seals (=774*0.008). All estimates were rounded to the nearest whole individual. All original NODES take calculations were left in Table 12 for reference.

6.5.2 Number of Requested Takes

Table 12 displays both the estimated number of incidental takes during each construction phase and the takes requested by Transco for each species. Small numbers of Level A takes in relation to stock size are being requested for two species: gray seal and harbor seal. Small numbers of Level B takes in relation to stock size are being requested for 10 species: gray seal, harbor seal, harp seal, fin whale, humpback whale, minke whale, North Atlantic right whale, bottlenose dolphin, common dolphin, and harbor porpoise (see Table 12 and Table 13).

Table 12
Calculated Numbers of Marine Mammals at Potential Risk of "Incidental Take" by Harassment during Installation and Removal of Piles and the Requested Number of Takes

Species	Calculated Level A Takes, Installation	Calculated Level B Takes, Installation	Calculated Level A Takes, Removal	Calculated Level B Takes, Removal	Total Requested Level A Takes[a]	Total Requested Level B Takes[a,b]
Pinnipeds						
Gray Seal	7.46[c]	528.04[c]	0.00[c]	305.42[c]	6[d]	774[d]
Harbor Seal	16.07[c]	1,137.51[c]	0.00[c]	657.94[c]	12[d]	1,377[d]
Harp Seal[e]	Not Calculated	Not Calculated	Not Calculated	Not Calculated	0	4
Cetaceans						
Whales						
Fin Whale[f]	0.04	1.64	0.00	2.46	0	5
Humpback Whale[f,g]	0.00	0.19	0.00	0.43	0	34
Minke Whale[f]	0.00	0.36	0.00	0.41	0	1
North Atlantic Right Whale	0.04	0.93	0.00	0.54	0	2
Dolphins and Porpoises						
Bottlenose Dolphin	0.34	4,004.30	0.00	2,326.09	0	6,331
Common Dolphin	0.00	60.12	0.00	34.20	0	95
Harbor Porpoise	0.28	6.91	0.00	3.97	0	11

Notes:

[a] These numbers represent rounded, whole individuals of total requested individual takes.

[b] These numbers represent the total requested Level B takes, calculated by subtracting total requested Level A takes from total calculated Level B takes, except for pinnipeds.

[c] Original pinniped take estimation using densities obtained from OBIS SEAMAP Strategic Environmental Research & Development Program NODES models (Navy 2007, 2012).

[d] Revised pinniped take estimation using systematic data collected by CRESLI (2019). Methodology is described in Section 6.5.1.

[e] Due to lack of data and their rare occurrence in the Mid-Atlantic region, no densities for harp seals were available. However, harp seals have been documented along the southern coast of Long Island during the winter. The most recent observation of harp seals in the vicinity of the Project area was in 2008 when four harp seals (maximum of two during a single sighting) were observed in March of that year at a seal haul-out site approximately 96.56 kilometers (60 statute miles) to the east on Long Island at Cupsogue Beach (CRESLI n.d.). Because so few harp seals have been documented in the region of the Project area, Transco is estimating that up to four harp seals (the total opportunistically observed at Cupsogue Beach in 2008) could enter into the Level B harassment ZOI.

[f] Removal take estimates for fin whales, humpback whales, and minke whales represent the fall removal schedule rather than summer in order to capture the most conservative take numbers in the event of a schedule shift into fall for pile-removal activities.

[g] Transco is requesting additional take for humpback whales due to anecdotal sightings within or near the Project Area that exceed the calculated take (Brown et al. 2018a; Brown et al. 2018b).

7 ANTICIPATED IMPACT ON SPECIES OR STOCKS

The anticipated impact of the activity upon the species or stock of marine mammals.

Transco is proposing the installation and removal of up to 163 temporary steel pipe piles using impact and vibratory devices, which would occur over 4,321 minutes (72 hours) for pile installation, and approximately 2,755 minutes (46 hours) of pile vibration for pile removal. The sound generated by vibratory and impact pile installation and vibratory pile removal during the Project would exceed the NOAA Fisheries Service in-water acoustic thresholds for both Level A and Level B (see Section 1.6, Tables 4 and 6). Therefore, these sound levels would be considered potentially injurious and behaviorally disturbing to marine mammals.

Transco is requesting authorization for Level A injury harassment takes for small numbers two marine mammal species and Level B acoustical harassment takes for small numbers of 10 marine mammal species. For the purpose of calculating the percentage of each species' stock potentially affected by the Project, population abundance was taken from the best available data in the most recent NOAA Stock Assessment Report (Hayes et al. 2018b). The number of takes in relation to the overall stock size of each of the 10 species are presented in Table 13.

Table 13
Requested Number of Takes and Percentage of Marine Mammal Stock Potentially Affected by Level A and B Harassment during Installation and Removal of Piles

Species	Stock	Stock Abundance	Level A Takes Requested	Percentage of Stock Potentially Affected by Level A Take	Level B Takes Requested	Percentage of Stock Potentially Affected by Level B Take
Gray Seal	Western North Atlantic	27,131	6	0.02%	774	2.85%
Harbor Seal	Western North Atlantic	75,834	12	0.016%	1,377	1.82%
Harp Seal	Western North Atlantic	7,400,000	0	0.00%	4	<0.0001%
Fin Whale	Western North Atlantic	1,618	0	0.00%	5	0.31%
Humpback Whale	Gulf of Maine	335	0	0.00%	34	10.15%
Minke Whale	Canadian East Coast	2,591	0	0.00%	1	0.04%
North Atlantic Right Whale[d]	Western Atlantic	455	0	0.00%	2	0.44%

Table 13
Requested Number of Takes and Percentage of Marine Mammal Stock Potentially Affected by Level A and B Harassment during Installation and Removal of Piles

Species	Stock	Stock Abundance	Level A Takes Requested	Percentage of Stock Potentially Affected by Level A Take	Level B Takes Requested	Percentage of Stock Potentially Affected by Level B Take
Bottlenose Dolphin	Western North Atlantic Coastal and Offshore Combined	84,171[a]	0	0.00%	6,331	7.52%
Common Dolphin	Western North Atlantic	70,184	0	0.00%	95	0.14%
Harbor Porpoise	Gulf of Maine/Bay of Fundy	79,883	0	0.00%	11	0.01%

Notes:
[a] Population abundance for bottlenose dolphins is based on the total combined population of coastal (6,639) and offshore bottlenose (77,532) stocks.

Marine mammals use sound for various components of daily survival, such as foraging, navigation, and predator avoidance. Marine mammals are also thought to use sound to learn about their surrounding environment, and to gather information from biological sources (such as inter- and intra-specific species) or naturally occurring phenomenon such as wind, waves, rain, and seismic activity (i.e., earthquakes) (Richardson et al. 1995). Behavioral reactions to sound can include a flight response, changes in breathing and diving patterns, avoidance of important habitat or migration areas, and a disruption of social relationships and interactions (Richardson et al. 1995; Nowacek et al. 2007; McCauley et al. 2000). Marine mammals may also respond to excessive noise levels with changes in call rates and call frequencies, and such noise levels can result in masking, which is a decreased ability of an animal to detect relevant sounds due to an increase in background noise that effectively blocks those sounds (Southall et al. 2007; Richardson et al. 1995; Nowacek et al. 2007). Physiological responses can include TTS, PTS, increased stress levels, and direct or indirect tissue damage (Richardson et al. 1995; Southall et al. 2007; Wright et al. 2007). TTS is the temporary and fully recoverable reduction in hearing sensitivity due to exposure to greater-than-normal sound intensity. PTS is the permanent and non-recoverable reduction in hearing sensitivity due to damage caused by either a prolonged exposure to a sound or temporary exposure to a very intense sound. When or how a marine animal responds to a sound depends on numerous variables such as the characteristics of the sound itself, characteristics of the animal (age, sex, habitat), and previous exposure to the sound of concern or other sounds (Wartzok et al. 2004).

Noise generated during pile installation and removal activities may be audible to marine mammals in the vicinity of the Project area. Most assessments of impacts associated with marine mammals and pile driving have focused on impact pile driving. The pulsed noise of impact pile installation produces greater sound source levels than vibratory installation or removal, thereby increasing the potential for adverse impacts. Behavioral reactions such as avoidance of the sound source, avoidance of feeding habitat, and changes in breathing patterns have been reported as reactions to increased sound levels (Malme et al. 1984; Richardson et al. 1995; Nowacek et al. 2007; Tyack 2009). Transco expects potential short-term avoidance of the 120 or 160 dB µPa RMS (and greater) ensonified areas associated with vibratory and impact pile-driving activities. Transco also expects that by implementing mitigation measures (described in Section 11), that injury (Level A) to marine mammals would be avoided. However, the level of disturbance from Level B noise associated with pile-driving activities would be greatly dependent on the local background noise. The possibility exists that marine mammals in the vicinity of the Project area and within the calculated ZOI may not be able to perceive noise from the pile-driving devices due to the background noise, which is likely to be dominated by loud, low-frequency commercial vessel noise (see Section 1.6.2).

In order for the NOAA Fisheries Service to authorize the incidental take of marine mammals, it must determine that there is a negligible impact on the marine mammal species or stock. As stated in 50 CFR § 216.103, NOAA Fisheries Service defines negligible impact to be "an impact resulting from a specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stocks [of marine mammals] through effects on annual rate of recruitment or survival."

Transco expects acoustical disturbance of marine mammal species would be temporary due to the short timeframe of the actual noise-producing pile-driving activities and the transient presence of the animals within the area. In addition, based on the very low percentage of each population that would be temporarily disturbed (see Table 13) through Level A injury and Level B acoustical harassment, Transco does not expect the Project would have an impact on recruitment or survival of any of the marine mammal stocks discussed in this application (Table 13). Therefore, based on the best available information and the information provided in this authorization request (including density, status, and distribution), Project-related pile installation and removal activities are expected to have a negligible impact on the marine mammal species and stocks that could occur in the vicinity of the Project area during the in-water construction period.

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8 ANTICIPATED IMPACTS ON SUBSISTENCE USES

The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.

This section is not applicable. The Project would take place in the Atlantic Ocean offshore of the states of New York and New Jersey, specifically, in the New York Bight region. There are no traditional subsistence hunting areas in the Project region.

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9 ANTICIPATED IMPACTS ON HABITAT

The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.

9.1 Introduction

In-water construction activities would have temporary impacts on marine mammal habitat by producing temporary disturbances, primarily through in-water sound pressure levels from vibratory and impact pile driving. Other temporary impacts resulting from in-water construction activities are changes in turbidity, water quality, and prey distribution. Mitigation measures implemented by Transco to minimize potential environmental effects from the Project are outlined in Section 11.0, Mitigation Measures.

9.2 In-Air Disturbance of Haul-outs

The closest known haul-out sites for seals in the vicinity of the Project area are located approximately 2.86 kilometers (1.78 statute miles) southwest of the Ambrose Channel Crossing site and 16.09 kilometers (10 statute miles) east of the MP14.5 to MP16.5 site. Based on initial modeling, in-air noise would attenuate to below the in-air harbor seal behavioral threshold of 90 dB RMS re 20µPa by 212 meters (0.13 statute miles), well before reaching the closest haul-out site 2.86 kilometers (1.78 statute miles) away (see Section 1.6.4). Therefore, there is no concern for acoustic disturbance of pinniped species while hauled out.

9.3 Underwater Noise Disturbance

Cetacean and pinniped occurrence in the Project area is expected to be transient. No distinct marine mammal foraging habitat has been identified in the vicinity of the Project area. Therefore, disturbance from underwater noise associated with the Project would be limited because marine mammals can avoid any potentially disturbing noise and would not be excluded from any important habitat.

Potential Sound Pressure Level Impacts on Fish Prey Species

Fish are a primary dietary component of the cetaceans and pinnipeds discussed in this application. Similar to marine mammals, fish can also be affected by noise, both physiologically and behaviorally. Acoustic threshold criteria for physiological and behavioral impacts on fish were originally developed by the Fisheries Hydroacoustic Working Group (FHWG) in 2008 (FHWG 2008). This guidance was updated in 2015 and specifies that it does not constitute official policy or regulation (California Department of Transportation 2015). The criteria determined by the

FHWG is based on impacts from traditional (rather than vibratory) pile driving; however, because this is the most current information for any physiological and behavioral acoustic impacts on fish, the criteria is assumed to be transferable for other human-generated sound sources. The FHWG determined that potential injury for all fish species is based on two criteria: (1) Peak SPL of 206 dB re 1μPa and (2) 187 dB SEL_{cum} dBre 1μPa^{2}s) for fish weighing 2 grams or more or 183 dB SEL_{cum} dB; re 1μPa^{2}s for fish weighing 2 grams or less (FHWG 2008). The California Department of Transportation (2015) continued to recommend these thresholds, despite more recent research indicating cumulative SEL thresholds for injury may be well above 200 dB (Popper et al. 2014). To assess behavioral disturbance, the NOAA Fisheries Service and U.S. Fish & Wildlife Service have generally applied a threshold criterion of 150 dB re 1μPa RMS for behavioral impacts on ESA-listed fish in addition to the peak and SEL_{cum} values indicated above developed by the FHWG (NOAA GARFO 2017; California Department of Transportation 2015).

Project-related noise is anticipated to exceed the threshold criteria for physiological and behavioral impacts on fish. During impact pile driving, peak SPL for 36-inch and 60-inch piles is measured at 210 db re 1μPa (California Department of Transportation 2015), which exceeds the peak injurious threshold of 206 dB re 1μPa. This activity does have the potential to cause injury within 18.5 meters (60.7 feet) from the sounds source (as calculated using the Practical Spreading Model [see Section 1.6.3]) if the 206 dB (RMS) received peak level criterion is applied. During impact and vibratory pile driving, the sound source levels of each sized-pile meet or exceed threshold of 150 dB re 1μPa RMS for behavioral disturbance to fish (California Department of Transportation 2015). This area of potential behavioral disturbance to fish (as calculated using the Practical Spreading Model) ranges from 10 meters (32.8 feet) to 10,000 meters (32,808 feet) from the sound source. However, disturbance to fish is expected to be short term.

The Project area is not distinct from the surrounding New York Bight region, so it is expected that cetaceans and pinnipeds would still be able to feed on fish prey species in the areas surrounding the Project area, and any effects on any fish prey species would not impact the cetaceans or pinnipeds discussed in this application.

9.4 Turbidity and Water Quality Impacts

Turbidity

During the course of the Project, various activities are expected to disturb the sediment. Transco is considering using the following offshore construction equipment and methods along the preferred Raritan Bay Loop route. The equipment and methods described below have the

potential to affect water quality by increasing turbidity and sediment transport from seabed disturbance.

- Dredging and material placement (fill) activities;
- Horizontal directional drill;
- Anchoring/spudding;
- Pile-driving activities (using diesel impact hammers and vibratory devices);
- Cable crossing, including potential concrete mattress or equivalent installation; and
- Subsea tie-in skid and tie-in spool installation (using hand-jets and/or suction dredge).

All of these activities are expected to resuspend disturbed sediment and result in turbid conditions in the immediate Project area. Considering sediment type, the strength of the currents in the offshore Project area, and the duration and rate of sediment-disturbing activities, ambient turbidity conditions are expected to return shortly after completion of each proposed offshore excavation activity. This assessment is based, in part, on monitoring of several dredging events associated with recent deepening of the New York-New Jersey Harbor. In particular, turbidity plumes generated during the harbor-dredging activities dissipated to ambient conditions within 200 meters (656 feet) in the upper water column and within 800 meters (2,625 feet) in the lower water column, even when dredging sediments were predominantly silt and clay (50% to 95%) (USACE 2015). Project-specific hydrodynamic and sediment transport and dispersion modeling has been conducted for the currently proposed offshore pipeline construction activities. The results indicate that total suspended sediment (TSS) concentrations would be expected to return to ambient conditions within approximately 0.0 to 3.5 hours after clamshell dredge activities, including dredging and subsequent backfilling, stop. Additionally, TSS concentrations and sediment plumes would be expected to return to ambient conditions within approximately 1.0 to 8.0 hours after jet trencher activities, and within approximately 0.5 to 3.5 hours after hand jet or submersible pump use.

Turbidity within the water column has the potential to reduce the level of oxygen in the water column and interfere with gas absorption in the gills of fish species preyed upon by cetaceans or pinnipeds in the Project area (Clarke and Wilbur 2000; Germano and Cary 2005; Johnston 1981). However, turbidity plumes associated with the Project would be temporary and

localized, and fish in the Project area would be able to move away from and avoid the areas where plumes occur. Therefore, it is expected that the impacts on prey fish species from turbidity, and therefore on marine mammals, would be minimal and temporary.

Water Quality

An accidental release of contaminated sediments during dredging activities could degrade surrounding water quality, which could adversely impact marine mammals and/or their prey. As described above in Section 9.4, a sediment survey was conducted in 2016 along the offshore route. Sediments were shown to have elevated levels of contaminants with the potential to result in chemical effects on biota and benthic organisms; however, these levels were determined to be relatively low compared to other harbors across the U.S. Additionally, exceedances were never greater than one order of magnitude above either New York or New Jersey state thresholds, and contaminants were determined to likely result in only short-term water quality changes near the source of disturbance. Sediment survey results and subsequent modeling indicate that even the most contaminated sediments within the proposed offshore route would not adversely affect biota or overall food web systems.

The potential for accidental spills and/or inadvertent release of HDD fluids is also possible during construction of the offshore pipeline and could degrade surrounding water quality, thereby impacting marine mammals and/or their prey. However, these potential impacts would be avoided and/or mitigated through the use of best management practices and the implementation of the Spill Plan for Oil and Hazardous Materials and the Offshore HDD Contingency Plan.

9.5 Conclusions Regarding Impacts on Habitat

No direct loss of habitat available to marine mammals is expected to occur due to any of the activities associated with the Project. All marine mammal species using habitat near the Project area are primarily transiting through the area. No known foraging areas are located in the vicinity of the Project area, and the closest haul-out sites are 2.86 kilometers (1.78 statute miles) and 16.1 kilometers (10 statute miles) away.

Any adverse impacts on prey species are expected to be temporary and localized. Given the large numbers of fish and other prey species in the larger New York Bight region, the short-term effects on fish species, the ability of both prey species and marine mammals to avoid the areas of disturbance, and the availability of similar suitable habitat surrounding the Project area, the Project is not expected to have significant effects on the habitat or prey of marine mammal species in the Project area.

10 ANTICIPATED IMPACTS OF LOSS OR MODIFICATION OF HABITAT

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

During the course of the Project, various activities would cause benthic disturbance. These activities include dredging via clamshell dredge, pile installation and removal, laying the pipe on the seafloor, trenching via jet-trench, hand-jetting around the hot-tap and for the anode bed, backfilling via a small-scale suction dredge, and vessel anchoring. These activities would not result in the significant permanent loss or modification of habitat for marine mammals or their prey. The greatest impact on marine mammals associated with the Project would be the potential minimal and temporary loss of habitat due to elevated noise levels and the potential temporary impact on prey species due to turbidity. These temporary impacts are discussed in detail in Section 9.0, Anticipated Impacts on Habitat.

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11 MITIGATION MEASURES

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

The Project is anticipated to result in take by Level A injury and Level B acoustic harassment in the event that the construction crew are unable to shut down operations during a marine mammal sighting. Modeling and available data, including anecdotal sighting information, suggest it may result in Level A and Level B take of small numbers of gray seals and harbor seals, and Level B take of small numbers of harp seals, humpback whales, fin whales, minke whales, North Atlantic right whales, bottlenose dolphins, common dolphins, and harbor porpoises. Transco proposes to employ a number of mitigation measures in an effort to minimize the number of marine mammals exposed to harassment resulting from in-water pile-driving activities. Mitigation measures for in-water construction activities associated with the Project are provided below.

11.1 Proposed Measures for Pile Installation and Removal

Transco would use both a diesel impact hammer and a vibratory device to install and remove 163 temporary steel pipe piles. Transco anticipates conducting pile installation and removal activities in the months of June, July, and August, with the possibility of removal activities shifting to the fall. As discussed in Section 3.3.4, in the Project Area predicted North Atlantic right whale densities are lowest during the summer and early fall months; therefore, conducting pile installation and removal activities during this time period would reduce the likelihood of acoustic harassment of right whales.

Visual monitoring of the established exclusion(s) and monitoring zone(s) will be performed by qualified NOAA Fisheries-approved Protected Species Observers (PSOs). Because the Level B exclusion zone extends to >21,500 meters (13.4 statute miles), it would not be practicable for Transco to monitor the entire zone. Transco would monitor a 1,000-meter (0.62-statute-mile) “pre-clearance” zone for ESA-listed species (i.e., humpback whale, fin whale, and North Atlantic right whale) and a 100-meter “pre-clearance” zone for all non ESA-listed species (i.e., minke whale, bottlenose dolphin, common dolphin, harbor porpoise, and pinnipeds). Monitoring of the pre-clearance zone would begin 30 minutes prior to the start of pile installation or removal for the

day and throughout the time required to complete pile installation or removal. If a marine mammal is observed within the pre-clearance zone, start-up would be delayed until the observed marine mammal leaves the zone of their own volition or is not re-sighted within the zone for 30 minutes. Once the zone has been cleared, a “soft start” may begin. The purpose of a “soft-start” is to provide additional protection to marine mammals by signaling a warning. A soft start would provide an initial set of strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced energy strike sets. Soft start shall be implemented at the start of each day’s impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer. This warning would give the marine mammals the opportunity to leave the area prior to pile installation/removal activities. After “soft-start”, if no marine mammals are observed within the zone, pile installation and removal activities may begin. Once pile installation or removal has been completed for the day, a 30-minute post-construction survey of the clearance zone would be conducted to ensure that there were no delayed marine mammal injuries. A 30-minute post-construction survey would also be conducted before observers take their eyes off the water for an extended period of time (e.g., break, mechanical construction issues, etc., longer than 1 hour). If construction activities resume after an extended period of time, observers would begin another 30-minute pre-clearance survey before installation or removal activities can begin, followed by a soft start (if beginning impact pile driving). In the unlikely event a marine mammal comes within close proximately to the pile-driving sound source during any phase of the Project, Transco would implement a shutdown zone of 85 meters (279 feet) for all species except North Atlantic right whales. If a right whale is sighted at any distance during pile-driving activities, the current operation would be halted. The 85-meter (279-foot) zone was calculated based on the distance to the injury peak source level (202 dB re 1μ Pa) for a 66-inch steel pile (210 dB re 1μ Pa) plus a 50-meter (164-foot) buffer zone. However, if the sighting occurs before the pile has been driven to a sufficient depth to allow for pile stability and conditions are such that the support structure would need to be removed (e.g., weather conditions are deteriorating), then for safety reasons the current pile would need to be driven to a sufficient depth to allow for stability and a shutdown would not be feasible until after that depth was reached. Additionally, if environmental conditions (e.g., heavy fog) prevent the observers from detecting animals within the clearance zone, activities would be delayed until sighting conditions improve. All in-water construction and removal activities would be conducted during daylight hours, no earlier than 30-minutes after sunrise and no later than 30-minutes before sunset. If lighting conditions prevent the observer from effectively monitoring the clearance zone, construction would not be allowed to start.

Using this approach would avoid incidental takes as well as allow work to be completed as quickly as possible, avoid delays, and minimize the time required for pile installation and removal during a given day.

- In-water construction shall occur during the period of time when the predicted density of the North Atlantic right whale is at its lowest in the Project area (i.e., summer and early fall months).
- A minimum of two NOAA Fisheries Service-approved observers (i.e., Protected Species Observers [PSOs] or Marine Mammal Observers [MMOs]) would be stationed within the clearance zone, one on a barge and one on an escort boat, during impact and vibratory pile installation and removal. The escort boat location would shift depending on work location, but will be a minimum of 100 to 200 meters (328 to 656 feet) from the pile-driving location, depending on the site and the ensonification area associated with that specific pile-driving scenario. It is likely that the escort boat distance may be greater to accommodate the anchor spread of the crane barge.
- All observers shall be trained in marine mammal identification and behaviors, and shall have no other construction-related tasks while conducting monitoring.
- The escort boat would monitor the clearance zone, with the observers monitoring 360° around the vessel (between the pile driving and the vessel and from the escort vessel out to the extent of the zone).
- If marine mammals are observed, the sighting would be fully documented. If a marine mammal is observed within the shutdown zone, all in-water operations would cease until the animal has left the zone.
- Information recorded during each observation would include, to the extent possible:
    - Marine mammal species, date and time of sighting, bearing to animal in relation to position of observer, behavior, overall numbers of individuals observed, frequency of observation, and pile-driving activity (i.e. impact/vibratory, pre-, active-, post-construction, etc.).

11.2 Transiting Vessels

A variety of vessels would be located in the area throughout the duration of the Project. This activity is not considered a concern for harassment of marine mammals in the vicinity of the Project area because of the high level of vessel activity associated with both commercial traffic (to and from the Port of New York and New Jersey) and recreational traffic that already occurs in the region. However, due to the critically endangered status of the North Atlantic right whale, vessel activity and speed regulations are already in place along the East Coast. As mentioned in Section 3.3.4.3 (North Atlantic Right Whale Distribution), a portion of the Project area is located within an SMA associated with the Port of New York and New Jersey between November and April. While this SMA is in effect, transiting vessels and vessel operators associated with the Project would comply with speed regulations within the SMA.

At all times and locations, vessel operators and crews would use the following protocols:

- Maintain a vigilant watch for right whales and slow down or stop the vessel to avoid striking the animal(s).
- Conform to the regulations prohibiting the approach of right whales closer than 457.2 meters (500 yards) (50 CFR 224.103(c)).
- Adhere to rules for Dynamic Management Areas (DMAs) if they are designated by NOAA Fisheries Service in the Project area during the Project.

11.3 Construction Activities

All in-water construction activities would comply with federal regulations to control the discharge of operational waste such as bilge and ballast waters, trash and debris, and sanitary and domestic waste that could be generated from all vessels associated with the Project. All vessels associated with the Project are expected to comply with USCG requirements for the prevention and control of oil and fuel spills (MARPOL, Annex V, Pub. L. 100−220 [101 Stat. 1458]).

- A spill prevention, control, and countermeasures plan (SPCC Plan) would be developed for the Project.
- No petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials shall be allowed to enter surface waters.
- Equipment that enters the surface water shall be maintained to prevent any visible sheen from petroleum products appearing on the water.

- There shall be no discharge of oil, fuels, or chemicals to surface water or onto land where there is a potential for reentry into surface waters.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground- or surface waters.
- The contractor shall regularly check fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc., for leaks and shall maintain and store materials properly to prevent spills.
- Projects and associated construction activities shall be designed so potential impacts on species and habitat are avoided and minimized to the extent practicable.

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12 ARCTIC PLAN OF COOPERATION

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

(i) A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation;

(ii) A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation;

(iii) A description of what measures the applicant has taken an/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and

(iv) What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation.

This section is not applicable. The Project would take place in the Atlantic Ocean in the coastal waters off the states of New York and New Jersey, specifically the New York Bight region, and no activities would take place in or near a traditional Arctic subsistence hunting area. There are no subsistence uses of marine mammals impacted by this action.

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13 MONITORING AND REPORTING PLANS

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Monitoring Plan

Transco has developed a Marine Mammal Monitoring Plan, described briefly in Section 11.1 and described in more detail below.

Visual Monitoring Procedures

Transco proposes the following Marine Mammal Monitoring Plan in order to monitor disturbance from pile installation and removal activities associated with the Project:

- One NOAA Fisheries Service-approved observer (i.e., PSOs and/or MMOs) would be stationed on the barge and another on the escort boat.
    - The 100-meter (0.062-statute-mile) pre-clearance zone for non-ESA-listed species and the 1,000-meter (0.62-statute-mile) pre-clearance zone for ESA-listed species would be established by the observers by using a range finder.
    - The escort boat would monitor the NOAA-approved pre-clearance zone and would clear the zone prior to the start of any pile installation and removal activities as described in Section 11.1.
    - Observers would monitor 360° around the vessel.
    - Observers would make note of the sea state using the Beaufort scale and weather conditions during observations.
    - During all pile installation and removal activities, observers would use binoculars and/or naked eye to continuously search for marine mammals.
    - If marine mammals are observed within the pre-clearance zones, the sighting would be fully documented, including the following, when possible:

- Bearing to animal relative to MMO position (using compass)
- Overall numbers of individuals observed
- Frequency of observations
- Estimated location within the zone (i.e., distance from the source)
- Type of construction activity (i.e., impact, vibratory [pre-, active-, post-operation])
- Behavioral state, possible reactions of the animals(s) to the pile driving (if any), and any behaviors the animals(s) may display while in the zone.

13.2 Reporting Plan

Transco would provide the NOAA Fisheries Service with a draft monitoring report within 90 days of the conclusion of monitoring. This report would include the following:

- A summary of the activity and monitoring plan (e.g., dates, times, locations)
- A summary of mitigation implementation
- Monitoring results and a summary that addresses the goals of the monitoring plan, including (but not limited to):
  - Environmental conditions when observations were made:
    - Water conditions (i.e., Beaufort sea-state, tidal state)
    - Weather conditions (i.e., percent cloud cover, visibility, percent glare)
  - Observation-specific data:
    - Date and time observations were initiated and terminated
  - Date, time, number, species, and any other relevant data regarding marine mammals observed (for pre-activity, during activity, and post-activity observations)
  - Description of the observed behaviors (both the presence and absence of activities)
  - Assessment of implementation and effectiveness of prescribed mitigation and monitoring measures

- If any type of take not permitted by the IHA is believed to have occurred, activities would immediately cease and the incident would be reported to NOAA Fisheries Service.
- If an injured or dead marine mammal is discovered, cause of death or injury is unclear, and death is relatively recent (i.e., animal is in less than a moderate state of decomposition), the observation would be immediately reported to the Regional Stranding Coordinator.
- If an injured or dead marine mammal is discovered in which cause of death is clear and unrelated to the project or death is not recent (i.e., animal is in a moderate to advanced state of decomposition), the observation would be reported to the Regional Stranding Coordinator within 24 hours.

If comments are received from the NOAA Fisheries Service on the draft report, a final report would be submitted to the NOAA Fisheries Service within 30 days after all comments are received. If no comments are received from the NOAA Fisheries Service, the report submitted would be considered the final report.

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14 COORDINATING RESEARCH TO REDUCE AND EVALUATE INCIDENTAL TAKE

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

To encourage learning and coordinate research opportunities related to the incidental taking of marine mammals, any data gathered during in-water construction would be made available to NOAA Fisheries Service, researchers, and other interested parties. Also, if any ESA-listed North Atlantic right whales are observed at any time while observers are present or during the course of all in-water construction, sightings would be reported to the NOAA Fisheries Service NEFSC North Atlantic right whale SAS to aid in alerting other boaters (especially commercial shipping vessels) in the area of the animals' presence. This would also help to increase knowledge of the locations that these animals frequent along the East Coast during their winter migration.

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