Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

Northeast Supply Enhancement Project
Final Environmental Impact Statement

Transcontinental Gas Pipe Line Company, LLC

Docket No. CP17-101-000
FERC/EIS-0280

Cooperating Agencies:

U.S. Army Corps of Engineers	U.S. Environmental Protection Agency	City of New York

January 2019

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 2
Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement Project
Docket No. CP17-101-000

TO THE INTERESTED PARTY:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared a final environmental impact statement (EIS) for the Northeast Supply Enhancement Project (NESE Project or Project) as proposed by Transcontinental Gas Pipe Line Company, LLC (Transco) in the above-referenced docket. Transco requests authorization to construct and operate 36.9 miles of onshore and offshore natural gas transmission pipeline loop[1] and associated facilities, one new natural gas-fired compressor station, and modifications at one existing compressor station. The Project would provide about 400,000 dekatherms per day of natural gas to end use residential and commercial customers in the New York City area.

The final EIS assesses the potential environmental effects of the construction and operation of the Project in accordance with the requirements of the National Environmental Policy Act (NEPA). The FERC staff concludes that approval of the Project would result in some adverse environmental impacts; however, all impacts would be reduced to less-than-significant levels with the implementation of Transco's proposed mitigation and the additional measures recommended in the final EIS.

The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and the City of New York participated as cooperating agencies in the preparation of the EIS. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis. Although the cooperating agencies provided input to the conclusions and recommendations presented in the EIS, the agencies will present their own conclusions and recommendations in their respective Records of Decision or determination for the Project.

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[1] A loop is a segment of pipe that is installed adjacent to an existing pipeline and connected to it at both ends. A loop generally allows more gas to move through the system.

The final EIS addresses the potential environmental effects of the construction and operation of the following Project facilities:

- 10.2 miles of 42-inch-diameter pipeline loop in Lancaster County, Pennsylvania (the Quarryville Loop);
- 3.4 miles of 26-inch-diameter pipeline loop in Middlesex County, New Jersey (the Madison Loop);
- 23.5 miles of 26-inch-diameter pipeline loop in Middlesex and Monmouth Counties, New Jersey, and Queens and Richmond Counties, New York (the Raritan Bay Loop[2]);
- modification of existing Compressor Station 200 in Chester County, Pennsylvania;
- construction of new Compressor Station 206 in Somerset County, New Jersey; and
- ancillary facilities (including cathodic protection systems, new and modified mainline valves with tie-in assemblies, new and modified launcher/receiver facilities, and facilities to connect the Raritan Bay Loop to the existing Rockaway Delivery Lateral at the Rockaway Transfer Point).

The Commission mailed a copy of the *Notice of Availability* to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the Project area. The final EIS is only available in electronic format. It may be viewed and downloaded from the FERC's website (www.ferc.gov), on the Environmental Documents page (https://www.ferc.gov/industries/gas/enviro/eis.asp). In addition, the final EIS may be accessed by using the eLibrary link on the FERC's website. Click on the eLibrary link (https://www.ferc.gov/docs-filing/elibrary.asp), click on General Search, and enter the docket number in the "Docket Number" field, excluding the last three digits (i.e., CP17-101). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659.

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[2] Except for 0.2 mile of pipe in onshore Middlesex County, New Jersey, the Raritan Bay Loop would occur in offshore New Jersey waters (6.0 miles) and offshore New York waters (17.3 miles).

Additional information about the Project is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. The eLibrary link also provides access to the texts of all formal documents issued by the Commission, such as orders, notices, and rulemakings.

In addition, the Commission offers a free service called eSubscription that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp.

Northeast Supply Enhancement Project

Final Environmental Impact Statement

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TECHNICAL ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
μg/L	micrograms per liter
μPa	micro-Pascal
$\mu Pa^2 \cdot sec$	micro-Pascal squared second
AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historic Preservation
AGT	Algonquin Gas Transmission, LLC
ANSI	American National Standards Institute 60
APE	Area of Potential Effect
AQCR	air quality control regions
AQMP	Air Quality Mitigation Plan
AQTR	Air Quality Technical Report
ASA	Agricultural Security Area
ASMFC	Atlantic States Marine Fisheries Commission
ATWS	additional temporary workspace
BA	Biological Assessment
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BO	Biological Opinion
BRWC	Bayshore Regional Watershed Council
C&ME	Construction and Marine Equipment
CAA	Clean Air Act
CEA	Classification Exception Area
CEQ	Council on Environmental Quality
CER	Creditable Emissions Reductions
Certificate	Certificate of Public Convenience and Necessity
CETAP	Cetacean and Turtle Assessment Program
CETP	Construction Emission Tracking Plan
CFR	Code of Federal Regulations
CGT	Columbia Gas Transmission, LLC
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
CP	cathodic protection
CWA	Clean Water Act
CWF	coldwater fishes
CZMA	Coastal Zone Management Act
dB	decibel
dBA	decibels on the A-weighted scale

DDT	Dichlorodiphenyltrichloroethane
DMF	dimethylformamide
DOT	U.S. Department of Transportation
DPS	distinct population segment
Dth/d	dekatherms per day
E2EM	estuarine intertidal emergent
ERC	emissions reduction credits
EDR	Environmental Data Resources, Inc.
EFH	essential fish habitat
EI	environmental inspector
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EMD	electric motor-driven
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FERC Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
FERC Procedures	Wetland and Waterbody Construction and Mitigation Procedures
FWPA	Freshwater Wetlands Protections Act
FWS	U.S. Fish and Wildlife Service
g	gravity
GHG	greenhouse gas
GIS	Geographic Information Systems
gpm	gallons per minute
GWP	global warming potential
GWQS	Groundwater Quality Standards
HAB	Harmful Algal Bloom
HAPCs	Habitat Areas of Particular Concern
HAPs	hazardous air pollutants
HARS	Historic Area Remediation Site
HCA	high-consequence area
HDD	horizontal directional drill
hp	horsepower
HUC	hydrologic unit code
Hz	hertz
IBA	Important Bird Area
IGT	Iroquois Gas Transmission System, LP
IHA	Incidental Harassment Authorization
INGAA	Interstate Natural Gas Association of America
IRR	Integra Reality Resources
kHz	kilohertz
LAA	likely to adversely affect
lb/MWh	pounds per megawatt-hour

LCAPB	Lancaster County Agricultural Preservation Board
L_d	nighttime noise levels
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
$L_{eq}(1)$	1-hour equivalent sound level
LNYBL	Lower New York Bay Lateral
LPCTS	Laboratory Prepared Chemically Treated Seawater
M&R	meter and regulating
MAOP	maximum allowable operating pressure
MASW	multichannel analysis of surface waves
MBTA	Migratory Bird Treaty Act
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MF	migratory fishes
mg/d	million gallons of water per day
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Millennium	Millennium Pipeline Company, LLC
MLV	mainline valve
MMPA	Marine Mammal Protection Act of 1972
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emission Simulator
MP	milepost
MPETP	Mitigation Project Emissions Tracking Plan
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuaries Act
mS/cm	millliSiemens per centimeter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
Muddy Run SGL	Muddy Run State Game Lands 423
N.D.	No Date
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
National Grid	Brooklyn Union Gas Company and KeySpan Gas East Corporation
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NESE Project	Northeast Supply Enhancement Project
NESHAPs	National Emission Standards for Hazardous Air Pollutants for Source Categories
NGA	Natural Gas Act
NHA	Natural Heritage Areas
NHPA	National Historic Preservation Act
NJ-NY-CT Interstate	New Jersey-New York-Connecticut Interstate
NJAC	New Jersey Administrative Code
NJBVMC	New Jersey Buddhist Vihara and Mediation Center

NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geological Survey
NJGWS	New Jersey Geological and Water Survey
NJHPO	New Jersey Historic Preservation Office
NJNHP	New Jersey Natural Heritage Program
NJSA	New Jersey Statutes Annotated
NLAA	not likely to adversely affect
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	*Notice of Intent to Prepare an Environmental Impact Statement for the Planned Northeast Supply Enhancement Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Sessions*
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSA	noise sensitive area
NSF	National Sanitation Foundation
NSPS	New Source Performance Standards
NSR	New Source Review
NTU	Nephelometric Turbidity Unit
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York Codes, Rules and Regulations
NYCWRP	New York City Waterfront Revitalization Program
NYNJPA	New York and New Jersey Port Authority
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York Department of State
OEP	Office of Energy Projects
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PADOA	Pennsylvania Department of Agriculture
PAFBC	Pennsylvania Fish and Boat Commission
PAGC	Pennsylvania Game Commission
PAGS	Pennsylvania Geologic Survey
PAH	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	perchloroethylene
PCO	Pennsylvania Certified Organic

PECO	PECO Energy Company
PEM	palustrine emergent
PFO	palustrine forested
pga	peak ground acceleration
PGP	PGP Valuation Inc.
PHMC	Pennsylvania Historical and Museum Commission
PHMSA	Pipeline and Hazardous Materials Administration
P.I.	Point of inflection
PJM	PJM Interconnection
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
PNHP	Pennsylvania Natural Heritage Program
ppm	parts per million
ppmvd	parts per million by volume – dry
ppt	parts per thousand
ppv	peak particle velocity
PRM	Potomac-Raritan-Magothy
Project	Northeast Supply Enhancement Project
PSD	Prevention of Significant Deterioration
PSE&G	Public Service Electric and Gas Company
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub
PSU	practical salinity units
PTS	permanent threshold shift
QPX	Quahog Parasite Unknown
RACT	Reasonably Available Control Technology
RBS	Raritan Bay Slag
RCP	Residential Construction Plans
RDL	Rockaway Delivery Lateral
re	relative to
RHA	Rivers and Harbors Act
right whale	North Atlantic right whale
RMP	risk management plan
RMS	root-mean-squared
RPS	RPS Group Plc.
SAP/QAPP	Offshore Sampling and Analysis Plan/Quality Assurance Project Plan
SCADA	Supervisory Control and Data Acquisition
SCR	selective catalytic reduction
SDWA	Safe Drinking Water Act
Secretary	Secretary of the Commission
SEL_{cum}	cumulative sound exposure level
SHPO	State Historic Preservation Office

SIP	State Implementation Plans
SMA	Seasonal Management Area
SO_2	sulfur dioxide
SOTA	state of the art
Spill Plan	Spill Plan for Oil and Hazardous Materials
SSFATE	Suspended Sediment Fate
SSURGO	Soil Survey Geographic Database
STSSN	Sea Turtle Standing and Salvage Network
SWPA	source water protection area
TBP	Theoretical Bioaccumulation Potential
TDS	total dissolved solid
TETCO	Texas Eastern Transmission, LP
TGP	Tennessee Gas Pipeline Company, L.L.C.
THPO	Tribal Historic Preservation Office
TMDL	total maximum daily load
tpy	tons per year
Transco	Transcontinental Gas Pipe Line Company, LLC
Transco Plan	Project-Specific Erosion Control, Revegetation, and Maintenance Plan
Transco Procedures	Project-Specific Wetland and Waterbody Construction and Mitigation Procedures
TSF	trout stocked
TSS	total suspended solids
UDP	Unanticipated Discovery Plans
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VOC	volatile organic compound
VTS	Vessel Traffic Services
WHPA	Wellhead Protection Area
WRA	Well Restriction Area
WQMAP/ BFHYDRO	Water Quality Model and Analysis Package/Boundary-Fitted Hydrodynamics
WWF	warmwater fishes

EXECUTIVE SUMMARY

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this final Environmental Impact Statement (EIS) to fulfill requirements of the National Environmental Policy Act of 1969 (NEPA) and the Commission's implementing regulations under Title 18 of the Code of Federal Regulations Part 380 (18 CFR 380). This EIS assesses the potential environmental impacts that could result from constructing and operating the Northeast Supply Enhancement Project (NESE Project or Project).

On March 27, 2017, Transcontinental Gas Pipe Line Company, LLC (Transco) filed an application with the FERC in Docket No. CP17-101-000 pursuant to section 7(c) of the Natural Gas Act (NGA) and Part 157 of the Commission's regulations to construct, own, and operate natural gas pipeline facilities that would expand Transco's existing onshore interstate natural gas transmission system in Pennsylvania and New Jersey and its existing offshore natural gas transmission system in New Jersey and New York waters.

The FERC is the federal agency responsible for authorizing interstate natural gas transmission facilities under the NGA and is the lead federal agency responsible for preparing this EIS. The U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), and the City of New York are cooperating agencies which assisted in preparing the EIS because they have jurisdiction by law or special expertise with respect to environmental resources and impacts associated with Transco's proposal.

PROPOSED ACTION

The NESE Project would consist of 10.2 miles of 42-inch-diameter pipeline loop[1] in Lancaster County, Pennsylvania (the Quarryville Loop); 3.4 miles of 26-inch-diameter pipeline loop in Middlesex County, New Jersey (the Madison Loop); 23.5 miles of 26-inch-diameter pipeline loop in Middlesex and Monmouth Counties, New Jersey, and Queens and Richmond Counties, New York (the Raritan Bay Loop[2]); modification of existing Compressor Station 200 in Chester County, Pennsylvania; construction of new Compressor Station 206 in Somerset County, New Jersey; and appurtenant facilities. The NESE Project would be capable of providing up to 400,000 dekatherms per day of incremental firm natural gas transportation service for Brooklyn Union Gas Company and KeySpan Gas East Corporation (collectively referred to as National Grid) in order to serve National Grid's residential and commercial customers in the New York City area beginning in the 2020/2021 heating season.

Dependent upon Commission approval and receipt of all other necessary permits and approvals, Transco proposes to begin construction in the second half of 2019 and place the Project in service by December 1, 2020, following a determination by the Commission that restoration is proceeding satisfactorily.

PUBLIC INVOLVEMENT

On May 9, 2016, Transco filed a request to implement the Commission's Pre-filing Process for the NESE Project. At that time, Transco was in the preliminary design stage of the Project and no formal application had been filed. The FERC established its Pre-filing Process to encourage early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve environmental issues before an application is filed with the FERC and facility locations are formally proposed. The FERC

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[1] A loop is a segment of pipe that is installed adjacent to an existing pipeline and connected to it at both ends. A loop generally allows more gas to move through the system.

[2] As detailed in section 2.0, except for 0.2 mile of pipe in onshore Middlesex County, New Jersey, the Raritan Bay Loop would occur in offshore New Jersey waters (6.0 miles) and offshore New York waters (17.3 miles).

granted Transco's request to use the Pre-filing Process on May 18, 2016 and established pre-filing Docket No. PF16-5-000 for the Project.

In June 2016, we[3] participated in four open houses held by Transco in the Project area and, on August 24, 2016, the FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Northeast Supply Enhancement Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Sessions* (NOI). The NOI was published in the Federal Register and sent to 1,865 parties, including federal, state, and local agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners; local libraries and newspapers; and other stakeholders who had indicated an interest in the NESE Project. The NOI requested written comments from the public and announced the time and location of public scoping sessions.

We held four public scoping sessions in the Project area in September 2016 and received verbal comments on environmental issues from 148 individuals, 128 of whom spoke at the session held near proposed Compressor Station 206 in Somerset County, New Jersey. We also held meetings and conference calls with federal, state, and local agencies throughout the Pre-filing Process to identify issues to be addressed in this EIS. The interagency meetings and conference calls provided a forum for the exchange of information and supported the FERC's responsibility to coordinate federal authorizations and associated environmental review of the Project.

On April 6, 2017, the FERC issued a *Notice of Application* announcing that Transco had filed an application with the FERC. The application filing concluded the Pre-filing Process and began the post-application review process for the NESE Project under new Docket Number CP17-101-000.

FERC issued a *Notice of Availability of the Draft Environmental Impact Statement for the Proposed Northeast Supply Enhancement Project* on March 23, 2018. The draft EIS was mailed to 2,595 federal, state, and local government agencies; elected officials; Native American tribes; affected landowners; local libraries and newspapers; intervenors in the FERC's proceeding; and other interested parties. The notice described procedures for filing comments on the draft EIS and announced the time and locations for public comment sessions on the draft EIS.

We held four public comment sessions during the draft EIS comment period. The comment sessions were held in April and May 2018 in Old Bridge and Somerset, North Jersey; Quarryville, Pennsylvania; and Brooklyn, New York. The comment sessions provided interested parties with an opportunity to present verbal comments on our analysis of the environmental impacts of the Project as described in the draft EIS. A total of 232 people commented at the sessions. In addition, 1,765 parties submitted a total of 2,245 letters in response to the draft EIS. All environmental comments that were received on the draft EIS through mid-December 2018 have been addressed in this final EIS.

PROJECT IMPACTS AND MITIGATION

Construction and operation of the NESE Project would impact the environment. We evaluated the impacts of the Project, taking into consideration Transco's proposed impact avoidance, minimization, and mitigation measures on geology, soils, groundwater, surface water, wetlands, vegetation, wildlife, fisheries, special status species, land use, recreation, visual resources, socioeconomics, cultural resources, air quality, noise, and safety and reliability. Where necessary, we recommend additional mitigation to minimize or avoid these impacts. Cumulative impacts of the Project with other past, present, and reasonably foreseeable actions in the Project area are also assessed. In section 3 of this EIS, we evaluate alternatives to the Project, including the No Action Alternative, the potential use of other natural gas transmission systems in the

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[3] The pronouns "we," "us," and "our" refer to the environmental staff of the Federal Energy Regulatory Commission's Office of Energy Projects.

region, modification alternatives to Transco's existing system, pipeline route alternatives, alternative locations for Compressor Station 206 and the associated permanent access road, the use of electric motor-driven compressors at Compressor Station 206, and different trenching methods to install the Raritan Bay Loop in the offshore environment.

Based on the public's involvement in the pre-filing and post-application review processes, agency consultations, and our analysis, the major issues associated with the Project are impacts associated with proposed new Compressor Station 206 and impacts on aquatic resources in Raritan Bay and Lower New York Bay. Our analysis of these specific issues is summarized below. Sections 3 and 4 of this EIS include our detailed analysis of Project alternatives and other environmental issues, respectively, and sections 5.1 and 5.2 contain our conclusions and a compilation of our recommended mitigation measures, respectively.

Compressor Station 206

Approximately 80 percent of all comments received that expressed concern with a specific element of the NESE Project pertained to proposed Compressor Station 206 and were filed by nearby residents, government officials, elected representatives, and other stakeholders. All comments are addressed in this EIS, but the majority of comments centered on public safety; public health impacts from air emissions; operational noise; visual impacts; impacts on the New Jersey Buddhist Vihara Meditation Center (NJBVMC); property values; groundwater contamination associated with the Higgins Farm Superfund site; site alternatives, and the alternative use of electric motor-driven compressors instead of natural gas-fired units as proposed.

<u>Public Safety</u>

Stakeholders expressed concern that the proximity of Compressor Station 206 to homes, schools, and places of worship would pose an elevated risk to public safety in the event of a fire at the facility. More specifically, commenters noted that the existing municipal water service in the area could not provide adequate water supply for fire-fighting purposes and that local fire departments may have insufficient resources to protect the public in the event of a fire at the compressor station. Many commenters also noted the location of the proposed compressor station relative to the Trap Rock Industries (Trap Rock) quarry and expressed concern that periodic blasting at the quarry could damage the compressor station over time. Lastly, several commenters were concerned that operation of Compressor Station 206 could cause a failure of Transco's existing Mainline pipelines to which the compressor station would be connected, or that the existing pipelines could be damaged by blasting at the Trap Rock quarry.

Safety is discussed in detail in section 4.11. In general, the U.S. Department of Transportation (DOT) is mandated to provide pipeline safety under 49 USC 601. To meet this mandate, the DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) develops and administers regulations and other approaches to risk management that provide safety in the design, construction, testing, operation, maintenance, and emergency response of natural gas transmission facilities. Safety incident data collected by PHMSA is an indicator of the effectiveness of these regulations. According to PHMSA, 19 safety incidents have been reported at compressor stations around the country since 2010 (when compressor station-specific data was first collected), resulting in one injury and no fatalities. Based on the the extensive pipeline infrastructure in the United States (including compressor stations), the overall potential of a significant incident at a given compressor station is low.

DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate of Public Convenience and Necessity is requested in accordance with DOT's federal safety standards and plans for maintenance and inspection. FERC accepts this certification and does not impose additional safety standards. Transco has committed to design, construct, operate, and maintain the Project facilities in accordance with the DOT's Minimum Federal Safety Standards in 49 CFR 192.

Many commenters provided inconsistent estimates of the distance between Compressor Station 206 and homes, schools, places of worship, and the Trap Rock quarry, with concern that the compressor station would be next to their home or within the quarry. For clarity, Compressor Station 206 as proposed by Transco would occupy about 16.1 acres within a 52.1-acre parcel that Transco has acquired to provide a buffer from surrounding land uses. The compressor building itself (which would house the compressor units and be the primary source of noise and air emissions) would be 2,500 feet from the nearest residence, with 8 homes within 0.5 mile of the building. The compressor building would be 2,530 feet from the nearest place of worship, 6,300 feet from the nearest school or daycare center, and 2,100 feet from the nearest face of the Trap Rock quarry, which is further discussed below.

Regarding emergency response at Compressor Station 206, DOT requires in 49 CFR Part 192.167 that each compressor station (except for unattended field compressor stations of 1,000 horsepower or less) have an emergency shutdown system that must meet several specifications in the event of an emergency or fire at the compressor station. The emergency shutdown system would be automated to quickly isolate gas piping, stop equipment, and safely vent station gas. Transco has stated that its automated emergency shutdown system would provide the most effective way to begin to address an emergency and that no fire hydrant would be necessary to address a fire at the site. Transco would also establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas emergency, and coordinate mutual assistance in responding to emergencies. Also, as required by the DOT, Transco would coordinate with local first responders to review the emergency response plan and provide mapping of the NESE Project facilities. Transco would work with local emergency officials to determine response procedures for remote residential areas with limited entry and exit routes. Transco would also conduct site-specific training and operator-simulated emergency exercises for local first responders. Finally, Transco would use all available and relevant means to support local emergency personnel in the event of an incident involving any of the Project facilities.

The Trap Rock facility is an active quarry where diabase bedrock is mined and processed into crushed stone, primarily for use as road base or in other construction materials. Mining has occurred since the mid-1850s and is expected to continue until approximately 2045. As noted above, the nearest face of the quarry to the proposed compressor building is 2,100 feet away and, based on the Franklin Township zoning map, the quarry is not expected to expand toward the compressor station site. Trap Rock conducts periodic blasting within the quarry. To assess the potential for blasting-related vibrations to damage Compressor Station 206, Transco monitored and analyzed vibrations at the compressor station site during blasting at the quarry.[4] Based on the analysis, the peak blast-induced displacement that the various equipment and foundations at the compressor station would experience would be negligible.

The compressor units would operate on bearings that are designed to meet equipment vibration specifications. Normal vibration associated with operation of the compressor station, coupled with the periodic displacements from blasting, would not exceed the vibration limits on the unit bearings. For added safety, each compressor unit would include 16 vibration monitors, and the vibration monitoring system would initiate a shut-down of the compressor unit if vibrations were detected in excess of unit bearing limits. After issuance of the draft EIS, we continued to receive comments concerning the potential for long-term, cumulative effects of blasting-induced vibrations on the compressor station. As stated in the draft

[4] The *Geotechnical and Vibration Analysis Report for Compressor Station 206* can be found on the FERC's eLibrary (https://www.ferc.gov/docs-filing/elibrary.asp) by conducting an "Advanced Search" for Accession No. 20170601-5277.

and final EIS, shut-down would occur regardless of the source of vibrations, including any potential cumulative effect from periodic blasting at Trap Rock quarry. Transco also committed to incorporate safety factors in the final foundation designs to prevent displacement if future blast intensity increases. In section 4.11.4, we recommend that Transco file its final foundation designs, prepared by a New Jersey licensed engineer, prior to construction.

After issuance of the draft EIS, we received additional comments concerning the potential for blast-induced vibrations to damage Transco's existing pipelines in the area. As stated in the final EIS, other than connecting Compressor Station 206 to Transco's existing Mainline pipeline system, Transco is not proposing to modify the Mainline system near the compressor station, and the Mainline system's current Maximum Allowable Operating Pressure (MAOP) of 800 pounds per square inch would remain unchanged upstream and downstream of the new station. Therefore, public safety concerns regarding the existing Mainline system near Compressor Station 206 are outside the scope of our review for the NESE Project. Although the scope of our environnmental review does not extend to the existing pipelines, the safe operation of the pipelines remains under the jurisdiction of the DOT. We also note that Transco's existing Mainline A and Mainline C pipelines were constructed in 1950 and 1969, respectively, and were relocated and replaced in 1987 to accommodate an expansion of the quarry. The pipelines are now about 0.4 mile from the nearest quarry face and Transco stated that there have been no operational issues on their system attributable to the Trap Rock quarry. Furthermore, the DOT defines pipeline Class areas and High Consequence Areas based primarily on proximity of natural gas facilities to human populations and specifies more rigorous safety requirements for increasingly populated areas. Transco's existing Mainlines are located in relatively low population Class 1 and Class 2 areas near the quarry, but are constructed and operated in accordance with more stringent Class 3 standards for added safety. These operating measures include the periodic inspection of the pipelines using internal tools that monitor the condition of the pipeline and identify areas for repair or replacement. The suction and discharge pipelines that would connect Compressor Station 206 to the Mainline system would also be constructed and operated in accordance with Class 3 standards and would not be within a High Consequence Area.

In conclusion, Transco would design, construct, operate, and maintain Compressor Station 206, including the inlet and outlet pipelines, in accordance with modern engineering practices that meet or exceed the DOT Minimum Federal Safety Standards which are protective of public safety, and added measures would be put in place to further ensure that the facility would not be affected by periodic blasting at the Trap Rock quarry.

Public Health Impacts from Air Emissions

Prior and subsequent to issuance of the draft EIS, many commenters expressed concern that the operating air emissions from Compressor Station 206 could adversely impact the health of individuals in the area and recommended that we conduct a health impact assessment for the facility. Ambient air quality is protected by federal and state regulations. The Clean Air Act (CAA) is the basic federal statute governing air pollution. Under the CAA, the EPA established the National Ambient Air Quality Standards (NAAQS) to protect human health and public welfare. These standards incorporate short-term (hourly or daily) levels and long-term (annual) levels to address acute and chronic exposures to the pollutants, as appropriate. The NAAQS include primary standards that are designed to protect human health, including the health of sensitive individuals such as children, the elderly, and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including visibility, vegetation, animal species, economic interests, and other concerns not related to human health. Individual states may set air quality standards that are at least as stringent as the NAAQS.

New Jersey has adopted the NAAQS but has additional ambient air quality standards, including an annual and 24-hour standard for total suspended particulates and a 1-hour ozone standard. Hazardous air pollutants (HAPs), also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer (carcinogens) or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. There are no national air quality standards for HAPs, but their emissions are limited through permit thresholds and technology standards. New Jersey maintains regulations limiting emissions of HAPs. Commenters on the draft EIS noted that New Jersey revised its HAPs regulations in February 2018; however, the revised thresholds would not apply to Compressor Station 206 as the New Jersey Department of Environmental Protection (NJDEP) issued the facility's operating air permit prior to the rule change.

New Jersey also requires that new or modified air emissions equipment or control devices incorporate state of the art control technology where NAAQS criteria pollutants and HAPs emissions exceed thresholds identified in the state code. The turbines at Compressor Station 206 would meet state of the art requirements through the use of SoLoNO_x and selective catalytic reduction (SCR) technology. These control technologies ensure that nitrogen oxides (NO_x) and carbon monoxide (CO) emissions meet performance levels required by state of the art regulations.

Compressor Station 206 would also be within the New Jersey-New York-Connecticut Interstate Air Quality Control Region (NJ-NY-CT Interstate AQCR), which is a moderate ozone nonattainment area for the 2008 8-hour standard. Nonattainment areas are held to more restrictive air permitting standards. The Project requires a federal General Conformity Determination because the combined direct and indirect construction emissions of NO_x would equal or exceed 100 tons in a calendar year in the nonattainment AQCR. FERC issued a *Notice of Draft General Conformity Determination for the Northeast Supply Enhancement Project* on September 18, 2018. The notice established a 30-day public comment period and was mailed to 6,851 stakeholders, and published in newspapers in the Project area. Comments on the draft General Conformity Determination were received from four individuals, the EPA, the NJDEP, the New York State Department of Environmental Conservation (NYSDEC), and the Eastern Environmental Law Clinic, and are addressed in the final General Conformity Determination included in appendix I and the responses to comments on the draft EIS and draft General Conformity Determination in appendix M. Transco would offset the direct and indirect construction emissions of NO_x through direct mitigation or purchase of available Emission Reduction Credits and/or Creditable Emission Reductions. We have determined that the NESE Project would achieve conformance with the New York and New Jersey State Implementation Plans with respect to the NJ-NY-CT Interstate AQCR through compliance with the requirements of 40 CFR 93.158(a)(2) and 40 CFR 93.158(c).

Transco provided a detailed emissions analysis for Compressor Station 206, including normal operating conditions and blowdown events. The emissions analysis determined that Compressor Station 206 would be a minor source of air emissions under the CAA Title V Operating Permit program and, because greenhouse gas (GHG) emission estimates exceed the reporting threshold, Transco would likely be required to report GHGs to the EPA under the Mandatory Reporting Rule. Methane is the primary pollutant emitted during a blowdown (a planned or unplanned gas venting of the compressor units), but other natural gas constituents, including ethane, propane, butane, pentane, and hexane, are also emitted. Blowdown emissions were included in overall station emissions as GHG and volatile organic compounds.

Transco also conducted air emission modeling in accordance with EPA and NJDEP guidelines, and the results indicate that Compressor Station 206 would meet the NAAQS. Transco performed an ambient air quality modeling analysis to determine local impacts from Compressor Station 206 using the EPA's AERMOD dispersion model (Version 16216) in screening mode, which indicated that the maximum modeling concentrations of criteria pollutants would not contribute to an exceedance of the NAAQS.

In conclusion, Transco would employ air pollution control measures to reduce NO_x, CO, and HAP emissions. At full-capacity upper bound (i.e., the station's full potential to emit) emissions from the station would meet the NAAQS. The station would also be a minor source of HAPs and other emissions under federal air permitting programs (i.e., New Source Review, Title V, and National Emissions Standards for Hazardous Air Pollutants). Transco obtained its air permit for Compressor Station 206 from the NJDEP and has committed to comply with all applicable permit requirements, including monitoring and reporting requirements. Based our analysis in section 4.10, we conclude that construction and operation of the Project would not have a significant impact on air quality, therefore, a health impact assessment for a facility of this size and limited impact is not warranted.

Operational Noise

Ambient daytime and nighttime noise measurements at the nearest noise sensitive areas (NSAs) to Compressor Station 206 were used to estimate the noise that would result from normal operation of the compressor station assuming winter conditions (no foliage). Noise estimates incorporated Transco's proposed noise mitigation measures including housing the compressor units within an acoustically insulated building and utilizing silencers on unit exhausts and air intake cleaners. Based on modeling, the estimated noise increase associated with Compressor Station 206 would range from 0.4 decibels on the A-weighted scale (dBA) to 0.7 dBA at the nearest NSAs, which is below the threshold of perception for the human ear (3 dBA).

To verify that Transco's noise estimates are accurate, we recommend that Transco file a noise survey after placing Compressor Station 206 in service. We further recommend that, if a full load condition noise survey is not possible, Transco file an interim survey at the maximum possible horsepower load. If the noise attributable to the operation of all of the equipment at the station under interim or full horsepower load exceeds 55 dBA day-night sound level (L_{dn}) at any nearby NSA, which the EPA has indicated protects the public from indoor and outdoor activity interference, Transco would be required to file a report on what changes are needed and install the additional noise controls to meet the level.

Noise would also occur during venting (blowdown) of natural gas for annual emergency shut-down system testing and during certain maintenance activities that would typically occur several times per year. Venting could also occur in the unlikely event of an emergency at the compressor station. Notice would be provided to landowners and local officials at least 1 week in advance of planned blowdowns. Transco would install silencers on the blowdown vents to reduce the associated noise to 60 dBA at a distance of 300 feet during planned blowdowns, although the blowdown associated with required annual testing may not be silenced. Although certain blowdown events may be audible in proximity to the compressor station, the noise would be periodic and short-term, and would diminish with distance from the station, and in nearly all cases, area landowners would have advanced notice of the event.

Based on the above discussion and our detailed analysis in section 4.0, we conclude that operation of Compressor Station 206 would not result in significant noise impacts at nearby NSAs.

Visual Impacts

As noted above, Compressor Station 206 would occupy about 16.1 acres within a 52.1-acre forested parcel that Transco would acquire. The site is bordered on the west by open and agricultural land; the three other sides are bordered by upland forest. County Road 518 is located about 1,500 feet west and Route 27 is located about 1,750 feet east of the site.

Transco would preserve a wooded buffer around the compressor station itself. At our request, Transco provided visual simulations of the compressor station from two locations where the facility could potentially be visible; one as viewed from County Road 518 to the west and one as viewed from the edge of the compressor station property to the east. Visual simulations were done for both summer (foliage) and winter (no foliage) months. At both viewpoints and for both seasonal scenarios, Compressor Station 206 would not be visible. Therefore, Compressor Station 206 would not result in a significant visual impact in the area.

New Jersey Buddhist Vihara Meditation Center

The 52.1-acre parcel on which Compressor Station 206 would be located abuts a 10-acre parcel owned by the NJBVMC to the east. The NJBVMC parcel extends away from the compressor station site and is about 1,900 feet deep and 200 feet wide. Existing facilities, including an outdoor Samadhi Buddha statue, are located on the eastern 2 acres of the parcel (farthest from the compressor station site), and a new building is under construction near the statue. The remainder of the parcel is wooded. NJBVMC is planning to construct meditation gardens near the front of the property along Route 27, and a meditation trail through the wooded portion of the property, nearer to the compressor station. The NJBVMC website indicates that the meditation trail would be constructed in the second quarter of 2019.

Based on Transco's proposed layout for the compressor station and NJBVMC plans, the meditation trail would be about 450 feet from construction at its nearest point, and the compressor building (the primary source of operational noise) would be approximately 1,225 feet from the meditation trail at its closest point. The compressor building would be about 2,530 feet from the Samadhi Buddha statue, of which 1,700 feet is forested.

Ambient noise was measured at the Samadhi Buddha statue and was combined with the estimated station operating noise to determine overall impacts. The noise increase above the existing ambient noise near the Samadhi Buddha statue would be 0.4 dBA, which is below the threshold of perception of the human ear. In addition, the estimated operational noise at the nearest point on the meditation trail to the compressor building (about 1,225 feet away) would be 46.8 dBA L_{dn}, which would comply with our operating noise requirement at NSAs of 55 dBA L_{dn}. Silenced blowdowns at Compressor Station 206 would result in an estimated noise level of 45 dBA at the nearest point on the meditation trail planned by the NJBVMC.

Given the distance and vegetative cover between the compressor station and NJBVMC facilities, construction effects would be temporary and minor near the Samadhi Buddha statue and nearby facilities. Construction at Compressor Station 206 would be generally limited to daylight hours (7:00 a.m. to 7:00 p.m.) Monday through Saturday and, therefore, would not impact the Dhamma School, which is held on Sundays. The planned meditation trail would be completed prior to construction of Compressor Station 206, which could take up to 15 months. Due to the intervening forested area, we would not expect trail users to see construction activity or to experience significant construction related dust. These impacts would also diminish with distance from the compressor station property. Also, as noted above, a visual simulation from the boundary between the NJBVMC property and Compressor Station 206 site indicated that the compressor station would not be visible from the NJBVMC property.

Based on the above discussion and our detailed analysis included in section 4.0, regarding air emissions and public safety, we conclude that construction and operation of Compressor Station 206 would not significantly impact the NJBVMC.

Property Values

Numerous studies have evaluated the impact of energy infrastructure facilities on surrounding property values. Two recent studies specifically assessed the effects of natural gas pipeline compressor stations on property values. The studies found no quantifiable evidence of a discernable effect on property values or appreciation rates of properties within 0.5 mile of compressor stations. While we acknowledge that it is reasonable to expect that property values may be impacted differently based on the setting and inherent characteristics of each property, there is no conclusive evidence indicating that compressor stations have a significant negative impact on property values. Furthermore, Compressor Station 206 would be visually screened from surrounding properties and noise attributable to normal operations would be below human perception and would meet our noise requirements at NSAs. Because visual and noise effects would diminish with distance from the compressor station, the facility would not be readily apparent to the great majority of homeowners in the area. We also note that many homeowners in the area reported that they experience noise, vibrations, and heavy truck traffic associated with the Trap Rock quarry; in section 4.12, we conclude that Compressor Station 206 would not contribute to these existing conditions.

Contaminated Groundwater

The Higgins Farm Superfund site is located west and adjacent to the 52.1-acre site on which Compressor Station 206 is proposed. Contaminated soil and drums were removed from the site in 1992, and subsequent soil and groundwater sampling identified volatile organic compounds (VOCs) and metals as the primary contaminants of concern at the site. The EPA implemented enhanced in-situ bioremediation and a groundwater extraction and treatment system to reduce contaminant concentrations and minimize further contaminant migration. Groundwater occurs in two separate hydrogeologic units beneath the site and generally flows toward the south and southeast (towards Compressor Station 206).

Based on 27 years of sampling at the site, VOC concentrations in groundwater are generally decreasing over time and have substantially degraded downgradient of bioremediation injection sites. The EPA expects VOC concentrations to continue to decline, but states that continued evaluation is necessary to confirm contaminant concentration reduction and the downgradient extent of contamination.

Perchloroethylene (PCE) is one of the primary contaminants of concern at the Higgins Farm Superfund site and the NJDEP groundwater quality standard for PCE is 1 microgram per liter (μg/L). The 2015 data from the five multi-level bedrock monitoring wells between the Higgins Farm site and the workspace at Compressor Station 206 indicates PCE concentrations below 1 μg/L in 10 of 13 samples obtained from depths of 42.5 to 194.5 feet. In the three remaining samples, obtained from depths of 140 to 190 feet, the maximum concentration of PCE detected was 2.9 μg/L, exceeding the NJDEP groundwater quality standard. Data from 2015 indicates that the PCE plume is about 400 feet from Compressor Station 206 construction workspaces and about 850 feet from the proposed compressor building. Ground elevations at the compressor station range from about 267 to 275 feet above mean sea level. In September 2015, the highest water level elevation measured in the EPA monitoring wells on the compressor station site was 238 feet above mean sea level, or about 30 feet below the proposed facility. Transco anticipates that the maximum excavation depth at Compressor Station 206 would be 15 feet, the maximum depth at which diabase bedrock was encountered. Transco's construction plans were reviewed by the EPA, who is assisting us in our environmental review of the NESE Project. The EPA finds, and we agree, that construction and operation of Compressor Station 206, as proposed by Transco, is unlikely to affect EPA's ongoing cleanup operations at the site.

Alternatives

We received numerous comments suggesting that Transco's existing system could be modified to eliminate the need for new Compressor Station 206. We considered alternatives that would involve increased compression at existing aboveground facilities, additional pipeline looping, and various combinations of added compression and looping. Based on our review of Transco's hydraulic modeling and our comparative environmental analysis, we conclude that alternative modifications of Transco's system would be either infeasible due to adverse effects on existing delivery points and/or would not provide a significant environmental advantage when compared to Transco's proposed expansion plans.

We also considered alternative locations for Compressor Station 206. Hydraulic modeling determined that the compressor station must be located near Transco's existing Mainline system between milepost 1780.0 in Mercer County, New Jersey and milepost 1790.8 in Middlesex County, New Jersey. Within this range, we evaluated 39 potential locations within about 0.5 mile of the Mainline system, as more distant locations would require increasingly longer inlet and outlet pipelines to connect the facility to the Mainline, affecting increasingly more landowners. As detailed in section 3.4.1, all 39 sites were subjected to preliminary review based on availability, shape, and the presence of wetlands as identified by NJDEP desktop data. The preliminary review identified four parcels that could potentially host Compressor Station 206, and these sites and Transco's proposed location were evaluated in more detail for impacts on forested land, wetlands, waterbodies, and proximity to residences, places of worship, and schools/daycare centers. For comparative purposes we standardized the size of the compressor station and included impacts associated with an access road and the inlet and outlet pipelines for each site. We did not include proximity to the Trap Rock quarry or the Higgins Farm Superfund site in our comparison because, as summarized above, these facilities do not pose a significant concern to Transco's proposed location for Compressor Station 206. In balancing the advantages and disadvantages of sites, we conclude that none of the alternatives offer a significant environmental advantage over Transco's proposed site, and do not recommend any of the alternative locations.

Lastly, we considered the use of electric motor-driven compressor units, rather than the natural gas-fired turbines, at Compressor Station 206. The use of electric motor-driven compressors would avoid the local operating air emissions associated with Transco's proposal. However, electricity is a secondary source of energy, i.e., other primary sources of energy such as fossil fuels (coal, oil, natural gas), nuclear, wind, solar, and hydroelectric are required to generate electricity. Based on the mix of electric generation sources in the area, we compared the NO_x, sulfur dioxide, and carbon dioxide emissions that would result from the proposed natural gas turbines at Compressor Station 206 to the emissions that would result from creating the electricity needed to power the electric motor-driven compression alternative and concluded that the alternative would result in greater air emissions in the region. The electric motor-driven compression alternative would also require construction and maintenance of a 3.9-mile-long electric transmission line and an electric substation at the compressor station. These additional facilities would result in greater impacts on all resources and affect more landowners. For these and other reasons discussed in section 3.5, we conclude that the electric motor-driven compression alternative does not offer a significant environmental advantage over Transco's proposed use of natural gas at Compressor Station 206, and we do not recommend the alternative.

Offshore Aquatic Resources

The primary impacts associated with construction of the Raritan Bay Loop would be the potential adverse effects on aquatic species due to sediment disturbance, increased turbidity and sediment redeposition (including contaminated sediments), and noise. Because the loop would be installed beneath the seafloor, operation of the pipeline would have little to no impact on aquatic resources. Potential impacts on aquatic resources are detailed in sections 4.5.2 and 4.5.3.

Construction of the Raritan Bay Loop would occur within a 14,165.5-acre workspace generally encompassing a 5,000-foot-wide area centered on the pipeline. The great majority of the workspace would be needed to accommodate the anchor spread around construction barges and would not actually be impacted by construction. Of the 14,165.5-acre designated workspace, an estimated 87.8 acres of seafloor would be directly impacted by construction (excavations, pipelay, anchoring systems, and backfilling).

Transco conducted sampling to determine the chemical and physical characteristics of sediments along the pipeline route in accordance with a plan that was submitted to the NJDEP and the NYSDEC for review. Based on this data and information regarding currents in Raritan Bay and Lower New York Bay, Transco conducted modeling to predict the turbidity and sediment deposition that would result from each sediment-disturbing activity. Since issuance of the draft EIS and in response to agency comments, Transco agreed to use an environmental bucket for all clamshell excavation work unless the environmental bucket encounters refusal due to hardpan or bedrock. Environmental buckets are essentially enclosed, thereby minimizing material loss as it is raised through the water column, resulting in reduced turbidity and sedimentation when compared to a traditional clamshell bucket. Based on the modeling, total suspended solids (TSS, a measure of turbidity) exceeding ambient conditions by 100 milligrams per liter (mg/L) would extend a maximum of 3,150 feet from clamshell excavation activities along the pipeline trench alignment, although 14.9 miles (64 percent) of the Raritan Bay Loop would be installed using a jet trencher, resulting in sediment plumes extending up to 262 feet to 1,345 feet from the source. In the worst-case excavation scenario, TSS would return to ambient conditions within 7.9 hours after sediment disturbance. For backfill placement activities, sediment modeling results indicate that TSS concentrations exceeding ambient conditions by 100 mg/L would extend up to 5,151 feet from the source but would return to ambient conditions within a maximum of 3.5 hours. Sediment transport modeling also estimated that 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediment.

Direct impacts on offshore resources due to seafloor disturbance would include mortality, injury, or temporary displacement of the organisms living on, in, or near the 87.8 acres of seafloor directly affected by the Project. Indirect impacts would include suspension of sediments in the water column, which could clog fish gills and obscure visual stimuli, and the redistribution of sediments that fall out of suspension, which could bury benthic and demersal species, resulting in mortality of eggs and other life stages. Benthic invertebrates and demersal (bottom-dwelling) fish species in or near areas directly impacted by construction would be most affected. Pelagic fish, sea turtles, and marine mammals could also be affected but would likely temporarily vacate the area to avoid the disturbance.

Suspended sediments and turbidity can elicit short- and long-term responses from aquatic biota depending on interactions between dynamic and complex factors such as sediment quality, grain size, water temperature, duration and frequency of exposure, species life stage and life history, season, physical condition of biota, and refugia/habitat availability. In general, benthic species are more tolerant of suspended sediments than pelagic species. The busy New York/New Jersey Harbor is exposed to ongoing sources of sediment resuspension, such as the periodic passage of storms, the riverine discharge of fresh water from rain and snowmelt, fishing activities, regulated maintenance dredging, and sediment disturbance by deep-draft vessel traffic. Thus, species inhabiting the region are likely accustomed to some degree of turbidity and sedimentation. TSS concentrations and sedimentation predicted for the Project are generally below the levels and durations that would be expected to adversely affect clams and other benthic organisms. Also, based on the results of a number of studies on benthic recovery, benthic communities can generally be expected to recolonize through natural succession in approximately 1 to 3 years.

Sediments within Raritan and Lower New York Bays contain contaminants from historical and ongoing anthropogenic sources. Seafloor-disturbing construction could resuspend sediment-bound contaminants into the water column, which could expose biota to contaminants and result in adverse effects. Transco's sediment chemical analysis found that most of the sample sites had at least one contaminant that exceeded upper-level effects thresholds. Concentrations of organic contaminants were greater than upper-level effects thresholds at approximately 33 percent of the sample sites. Approximately 83 percent of the sample sites had at least one exceedance of an inorganic (metal) threshold.

To provide a conservative worst-case bioaccumulation estimate of organic compounds by benthic organisms following sediment disturbance, Transco applied the Theoretical Bioaccumulation Potential model to the hard clam (*M. mercenaria*) and *Nereis virens*, a common polychaete worm species in the New York Bight, using the highest polychlorinated biphenyl (PCB) concentrations that were detected in the sampling effort. Based the relatively limited distribution of upper-level exceedances for mercury and other heavy metals along the Project route, the short duration of turbidity plumes, and the expected fate of metals released into the marine environment, the risk to aquatic resources from exposure to resuspended metals is expected to be low. Project-related sediment redeposition would also not substantially increase the bioaccumulation of PCBs in the benthic community.

Contaminants that become resuspended during sediment-disturbing activities are expected to generally be adsorbed to organic material and fine-grained sediment, and redeposited as sediment-bound compounds. The redeposited sediment is expected to be similar in contaminant concentration to the ambient conditions of the surface sediments at the depositional locations. To predict the transport and fate of contaminants that may be resuspended by Project construction, Transco conducted contaminant transport modeling for analytes that exceeded NYSDEC Class C and high Class B concentration thresholds in sediment samples. Based on the modeling results, the expected maximum concentrations would generally meet water quality standards at the edge of a 500-foot mixing zone. For some of the modeled scenarios, water quality standards for mercury and copper would not be met at the edge of the mixing zone, based on conservative rates of continuous dredging. In these areas, Transco would use dredging rates slower than 7,500 cubic feet per hour as necessary, based on field monitoring, to help ensure compliance with the water quality standards for copper and for mercury at sites with Class C concentrations of mercury. The release of sediment-bound contaminants could impact water quality and aquatic organisms along the proposed pipeline route; however, given the relatively short duration of excavation and backfilling activities, and the rapid pace at which resuspended sediments would settle out of the water column, impacts of contaminants on aquatic resources are anticipated to be temporary and minor. To verify that benthic communities recover as expected, we recommend that Transco file a post-construction benthic sampling and monitoring plan that identifies the duration of the monitoring period, the timing of sampling surveys, success criteria for assessing recovery of benthic species, and reporting requirements. We also recommend that Transco file the final volume of dredge material for disposal at onshore and offshore locations; the final onshore and offshore dredge disposal sites; and agency comments for disposal sites.

Regarding potential impacts of construction noise on aquatic resources, propeller use for positioning the larger Project-related vessels would be limited due to water depths in the area, and dynamic positioning thrusters would not be used. The Project area is within and near shipping lanes associated with the Port of New York and New Jersey, which is the largest port on the east coast of the United States. The background noise in the underwater environment is similar to the noise that would be generated by the largest vessels that would be used during construction of the pipeline. As such, the movement of the relatively small number of vessels associated with the Project would not be expected to substantially affect the existing underwater noise environment or aquatic resources.

Since the issuance of the draft EIS, Transco proposed several changes that would increase the number and size of temporary piles needed to construct the Raritan Bay Loop. Transco now proposes to install a total of 163 temporary piles, ranging from 10 inches in diameter to 60 inches in diameter. Of the 163 piles, 34 piles would be installed via a combination of diesel impact hammer and vibratory device. The remainder of the piles would be installed with vibratory devices. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device.

Potential noise impacts include temporary or permanent impacts on fish auditory systems that could reduce the survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success. Transco's acoustic modeling results indicate that the noise generated by pile driving would exceed both the injury and behavioral disturbance thresholds for fish. The 150 decibels (dB) re 1 micropascal (μPa) behavioral disturbance threshold for fish would be exceeded up to 705 feet from the source for vibratory pile driving, and up to 32,808 feet (6.2 miles) from the source for impact pile driving. Pile driving would exceed the 206 dB re 1 μPa peak sound pressure injury threshold for fish within a limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving ranged from 3,271 to 7,037 feet (0.6 to 1.3 miles). An individual fish would need to remain within this area during the entire duration of the pile driving event to experience an injury. Additionally, these zones would be constricted by land, and some of the pile driving noise is likely to be masked by ambient noise at distances shorter than those predicted by the noise modeling. The distance for behavioral disturbance associated with other construction activities (e.g., jet trenching, hand jetting) would be less than that associated with pile driving. Though the duration of construction activities would be limited and most fish species would be able to leave the area of disturbance, harassment or injury of individual fish due to pile driving noise is possible. However, pile driving and other construction-related noise impacts on fish are expected to be temporary and moderate, and population-level impacts due to construction noise are not expected. We have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with the predicted values and/or to reduce the noise to acceptable levels. Additionally, Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during timing restriction windows for marine species.

Pile driving noise could also impact marine mammals. Acoustic modeling indicates that impact pile driving could result in sound levels capable of causing marine mammal behavior disturbance up to 13.4 miles from the source for the largest piles. Vibratory pile driving and pile removal could conservatively result in sound levels capable of causing marine mammal behavioral disturbance up to 1.3 miles from the source for the largest piles. Given the amount of existing vessel traffic noise in the Project area, as well as noise monitoring reports from other recent underwater pile driving activities, we expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances. The modeling also indicates that impact pile driving noise levels at which permanent auditory damage could occur would be exceeded for all functional hearing groups present in the Project area, ranging from a minimum of 568 feet for mid-frequency cetaceans to a maximum of 18,973 feet (3.6 miles) for high-frequency cetaceans. Vibratory pile driving and pile removal is expected to exceed the injury thresholds for all functional hearing groups present in the Project area; however, this exceedance would occur within a relatively limited area around the sound source (i.e., less than 331 feet). Given that the auditory injury thresholds are with respect to cumulative sound impacts, a marine mammal would need to spend approximately 24 hours within this zone of exceedance to potentially experience a permanent hearing impact. Marine mammal densities in the Project area are low, and individual marine mammals would be unlikely to remain in the zone of exceedance long enough to be injured by pile driving noise. Additionally, the modeled zones of the exceedance would be constricted by land and somewhat smaller than predicted by the modeling. Noise associated with other in-water construction methods (e.g., jet trencher, clamshell dredging) would be of limited duration and extent and, thus, would not be expected to substantially disturb marine mammals.

In-air noise from offshore construction activities could also impact seals (pinnipeds) that inhabit Raritan and Lower New York Bays. To determine potential impacts on pinnipeds from in-air noise, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) has established a harassment threshold for all seals except harbor seals of 100 dB re 20 μPa, and a harassment threshold for harbor seals of 90 dB re 20 μPa, based on the root-mean-squared metric. Based on the results of Transco's modeling of noise associated with vibratory pile installation, in-air sound levels are not expected to exceed harassment thresholds at seal haul-out areas.

NMFS defines two levels of marine mammal harassment due to noise: Level A (injury or "take") and Level B (harassment). Level A takes would not be expected from the Project due to the limited duration of the pile driving activities, and low marine mammal densities. Transco is consulting with the NMFS and has submitted a draft application for an Incidental Harassment Authorization (IHA) for Level B harassment.

Transco expects that its final IHA application will request Level B takes of up to 10 marine mammal species that may be present in the vicinity of the Raritan Bay Loop during construction: gray seal, harbor seal, harp seal, bottlenose dolphin, harbor porpoise, short-beaked common dolphin, fin whale, North Atlantic right whale, humpback whale, and minke whale. We are recommending that Transco file its final acoustic analysis and a copy of the IHA application prior to construction. Transco also developed a Marine Mammal Observer Training and Response Protocol Plan that describes the actions that would be implemented during offshore construction to minimize impacts on marine mammals and protected species. As noted above, to verify that actual construction noise is consistent with the predicted values, we recommend that Transco file a noise monitoring and mitigation plan that includes measures that would be implemented to reduce noise to acceptable levels if the noise exceeds predicted levels. By constructing the Raritan Bay Loop in accordance with measures that may be included in the NMFS IHA, Transco's plans, and our recommendations, construction noise would not have a significant impact on marine mammals in the Project area.

As the lead federal agency for the Project, the FERC is required to consult with the U.S. Fish and Wildlife Service and the NMFS to determine whether federally listed threatened or endangered species or designated critical habitat under the jurisdiction of the Endangered Species Act (ESA) are found in the vicinity of the Project area, and determine the Project's potential effects on those species or their critical habitats. Due to potential pile driving noise impacts, we have determined that the Project may affect, and is likely to adversely affect, three federally listed aquatic species: the North Atlantic right whale, fin whale, and Atlantic sturgeon. In response to the FERC's Biological Assessment for these species (section 4.6), the NMFS will issue a Biological Opinion as to whether or not the Project would likely jeopardize the continued existence of these listed species. The Biological Opinion may include binding and/or discretionary recommendations to reduce impacts as well as an Incidental Take Statement for those actions that may harm or harass an ESA-listed species. As indicated below, we will complete ESA consultation prior to allowing any construction to begin.

In conclusion, as summarized above and detailed in sections 4.5.2 and 4.5.3, construction and operation of the Raritan Bay Loop would not result in significant impacts on aquatic resources in the Project area.

MAJOR CONCLUSIONS

As described in this executive summary and throughout the environmental analysis section of this EIS, we conclude that construction and operation of the NESE Project would result in some adverse environmental impacts. Most of these impacts would be temporary and occur during construction (e.g., impacts on residences and offshore impacts related to turbidity, sedimentation, and pile driving noise). Long-term impacts on air quality and noise would result from the operation of Compressor Station 206. We also conclude that, with implementation of Transco's impact avoidance, minimization, and mitigation measures, as well as their adherence to our recommendations, all Project effects would be reduced to less-than-significant levels. Although many factors were considered during our environmental review, the principal reasons for these conclusions are as follows:

- The Quarryville and Madison Loops would be collocated with existing Transco facilities for 97 percent and 100 percent of their lengths, respectively, with a typical offset of 25 feet from existing pipelines. Some workspace needed to construct the loops would overlap with Transco's current right-of-way, reducing construction-related impacts.

- Compressor Station 206 would comply with operating air permit conditions, and emissions would meet the NAAQS and other applicable standards that are protective of public health and welfare. Operating noise from the facility would meet our requirements at NSAs and the facility would be visually screened from surrounding viewpoints. All Project facilities, including Compressor Station 206, would be designed, constructed, operated, and maintained in accordance with DOT safety requirements that are protective of public safety.

- Direct and indirect construction emissions of NO_x would be offset through direct mitigation or the purchase of Emission Reduction Credits and Creditable Emissions Reductions, thereby conforming with the New York and New Jersey State Implementation Plans with respect to the NJ-NY-CT Interstate AQCR.

- The proposed route and construction methods for the Raritan Bay Loop were developed in consultation with the USACE and other agencies to minimize crossing designated anchorage areas, meet USACE marine traffic safety requirements, and reduce impacts on water quality and aquatic wildlife. Sixty-four percent of the offshore loop would be installed using a jet trencher, which would not require the removal and disposal of seafloor sediment. Thirty-one percent of the offshore loop would be installed using a clamshell excavator fitted with an environmental bucket, and an environmental clamshell would also be used to excavate horizontal directional drill (HDD) entry and exit pits. The remainder of the offshore loop would be installed via HDD, thereby avoiding direct seafloor impacts. Project-related turbidity would be temporary, and most sedimentation would occur near to the approximately 87.8-acre area of seafloor that would be directly affected by construction. In addition, Transco consulted with the NMFS, NJDEP, and NYSDEC to minimize construction conflicts with time of year restrictions for certain marine species to the extent practicable. As a result, impacts on aquatic resources would be temporary and minor to moderate.

- We evaluated numerous alternatives to Transco's proposal and determined that the alternatives would either not meet the stated purpose and need of the Project, would be infeasible, or would not provide a significant environmental advantage when compared to the proposed Project.

- The Project area has been substantially impacted by human activity. The Project and other actions in the area would cumulatively impact some resources, but most cumulative impacts would be temporary or short-term and minor. Project impacts on forest resources would be permanent but minor when compared to the extent of forest in the region, and operating air emissions from Compressor Station 206 would permanently contribute to other emission sources in the region but would comply with applicable regulations.

- Environmental inspection and monitoring programs would ensure compliance with all construction and mitigation measures that become conditions of the FERC authorizations and other approvals.

- We would complete the process of complying with the ESA prior to allowing any construction to begin.

- We completed our consultations with the NMFS regarding the potential for the Project to impact Essential Fish Habitat species and National Oceanographic and Atmospheric Administration Trust Resources.

- We would complete the process of complying with section 106 of the National Historic Preservation Act and implementing the regulations at 36 CFR 800 prior to allowing any construction to begin.

In addition, we recommend additional mitigation measures that Transco should implement to further reduce the environmental impacts that would otherwise result from construction and operation of the NESE Project. We recommend that these mitigation measures be attached as conditions to any authorization issued by the Commission. These recommended mitigation measures are presented throughout section 4 of the EIS in bulleted, bold text and are summarized in section 5.2.

1.0 INTRODUCTION

The Federal Energy Regulatory Commission (FERC or Commission) is responsible for deciding whether to authorize the construction of proposed interstate natural gas pipeline facilities. As part of its decision-making process, the Commission is required by the National Environmental Policy Act (NEPA) and its implementing regulations to consider the environmental impacts resulting from the construction and operation of a proposed project. The Commission's environmental staff has prepared this final Environmental Impact Statement (EIS) in compliance with the requirements of NEPA, the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (Title 40 Code of Federal Regulations Parts 1500–1508 [40 CFR 1500-1508]), and the FERC's regulations for implementing NEPA (18 CFR 380), to assess the environmental impacts that could result from the construction and operation of the Northeast Supply Enhancement Project (the NESE Project or Project) proposed by Transcontinental Gas Pipe Line Company, LLC (Transco).

The vertical line in the margin identifies text that is new or modified in the final EIS and differs materially from corresponding text in the draft EIS. Changes were made to address comments from the cooperating agencies and other stakeholders on the draft EIS; incorporate updated information provided by Transco regarding the NESE Project after publication of the draft EIS; and incorporate information filed by Transco in response to our recommendations in the draft EIS. As a result, 14 of the recommendations identified in the draft EIS are no longer applicable to the NESE Project and do not appear in the final EIS. Additionally, four recommendations in the draft EIS have been substantively modified in the final EIS, and six new recommendations have been added to the final EIS.

On March 27, 2017, Transco filed an application with the FERC in Docket No. CP17-101-000 pursuant to section 7(c) of the Natural Gas Act (NGA), and 18 CFR 157 of the Commission's regulations. Transco is seeking a Certificate of Public Convenience and Necessity (Certificate) to construct, own, and operate new facilities that would expand Transco's existing onshore interstate natural gas transmission system in Pennsylvania and New Jersey, and its existing offshore natural gas transmission system in New Jersey and New York waters.

The NESE Project consists of 10.2 miles of 42-inch-diameter pipeline loop[5] in Lancaster County, Pennsylvania (the Quarryville Loop); 3.4 miles of 26-inch-diameter pipeline loop in Middlesex County, New Jersey (the Madison Loop); 23.5 miles of 26-inch-diameter pipeline loop in Middlesex and Monmouth Counties, New Jersey, and Queens and Richmond Counties, New York (the Raritan Bay Loop[6]); modification of existing Compressor Station 200 in Chester County, Pennsylvania; construction of new Compressor Station 206 in Somerset County, New Jersey; and appurtenant facilities. Figure 1-1 depicts the location of the proposed facilities and a detailed description of the Project is presented in section 2.0.

1.1 PROJECT PURPOSE AND NEED

We[7] briefly discuss Transco's stated purpose and need for the NESE Project below; however, the Commission will independently determine if the Project is in the public convenience and necessity when it decides whether to authorize the Project after the final EIS is issued.

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5 A loop is a segment of pipe that is installed adjacent to an existing pipeline and connected to it at both ends. A loop generally allows more gas to move through the system.

6 As detailed in section 2.0, except for 0.2 mile of pipe in onshore Middlesex County, New Jersey, the Raritan Bay Loop would occur in offshore New Jersey waters (6.0 miles) and offshore New York waters (17.3 miles).

7 The pronouns "we," "us," and "our" refer to the environmental staff of the Federal Energy Regulatory Commission's Office of Energy Projects.

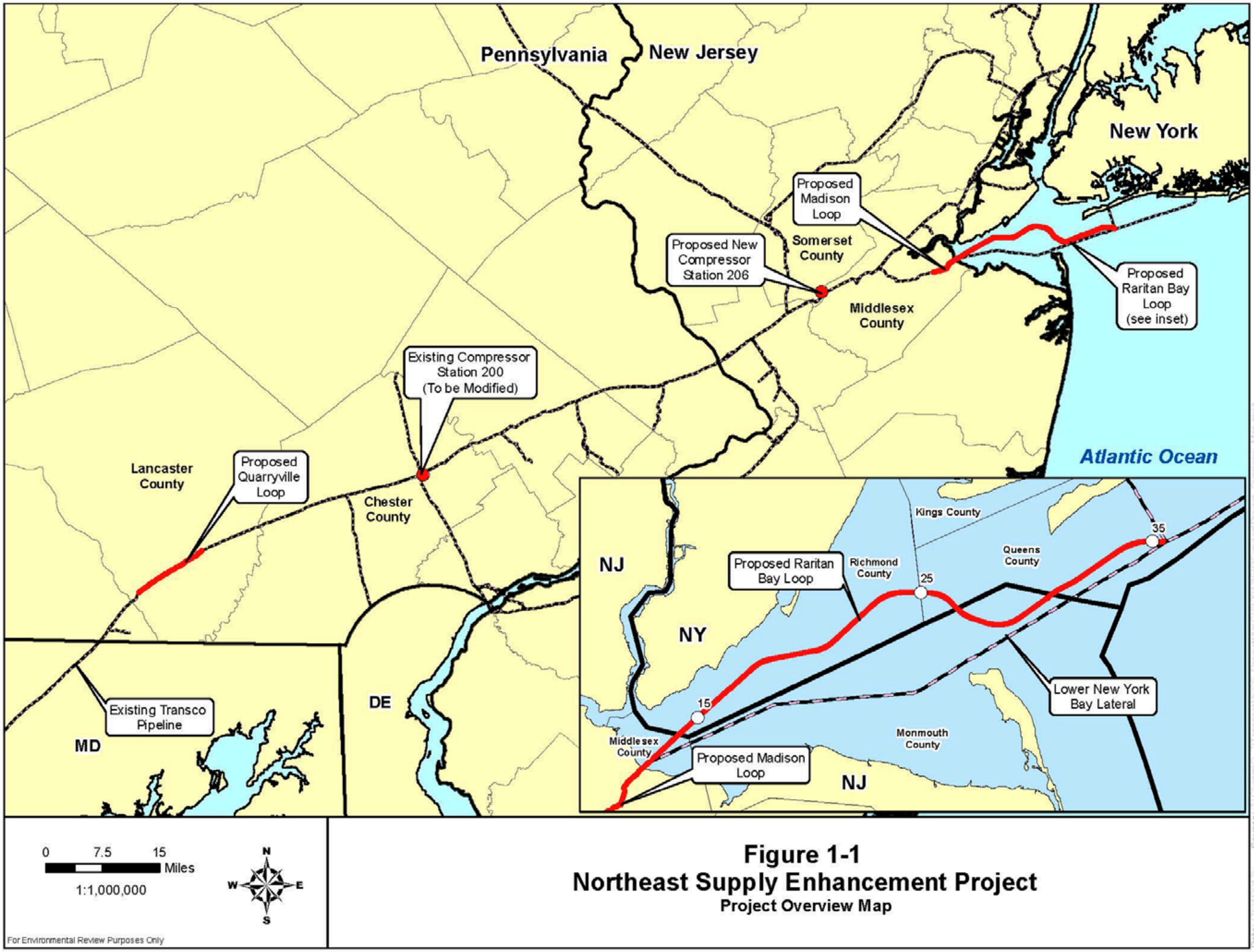

Figure 1-1
Northeast Supply Enhancement Project
Project Overview Map

Transco proposes to provide 400,000 dekatherms per day (Dth/d) of incremental firm natural gas transportation service to Brooklyn Union Gas Company and KeySpan Gas East Corporation (collectively referred to as National Grid) in order to serve National Grid's residential and commercial customers in the New York City area. According to Transco and in comments filed by National Grid, National Grid forecasts a need for additional natural gas supply in its downstate New York market beginning in the 2019/2020 heating season. However, on July 17, 2018 Transco modified the proposed Project schedule to facilitate compliance with construction timing restrictions associated with various special status species, and now proposes to begin service on December 1, 2020. The incremental capacity of the Project would extend from Transco's existing Compressor Station 195 in York County, Pennsylvania to the existing Rockaway Transfer Point in New York state waters, which National Grid determined to be the only delivery point that could serve the projected growth in demand on National Grid's system. Transco states that it has entered into long-term, fully binding precedent agreements with National Grid for 100 percent of the Project capacity. Transco also held a binding open season to allow other shippers to receive service under the Project, but no other shippers participated and the entire capacity created by the Project was contracted to National Grid.

According to Transco, the NESE Project would provide natural gas to New York City that is needed to support environmental initiatives within New York City's PlaNYC (New York City, 2011), which includes improving air quality through converting building heating systems from fuel oil to natural gas. Transco also asserts that the Project would ensure diverse sources of natural gas flowing into the New York City metropolitan area and improve system reliability by providing a second supply path to the Rockaway Transfer Point, which is currently served only by Transco's Lower New York Bay Lateral (LNYBL). National Grid also commented that the Raritan Bay Loop would enhance the reliability of Transco's service, noting that a loss of service on the existing LNYBL would result in the loss of supply to National Grid's Rockaway and Long Beach gate stations, and that the addition of the Raritan Bay Loop would allow for pipeline maintenance on one segment while maintaining flow on the other. Downstream uses of gas are discussed further in section 4.12.4.

1.2 PURPOSE AND SCOPE OF THIS EIS

Our principal purposes in preparing this EIS are to:

- describe the affected environment as it currently exists in the Project area;
- identify and assess potential impacts on the natural and human environment that would result from constructing and operating the Project;
- describe and evaluate reasonable alternatives to the Project that would avoid or substantially reduce adverse environmental effects while still meeting the Project's objectives;
- identify and recommend specific mitigation measures, as necessary, to avoid or further minimize environmental impacts; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

The environmental topics addressed in this EIS include geology; soils; groundwater and surface water; wetlands; vegetation; fish and wildlife; threatened, endangered, and other special-status species; land use and recreation; visual resources; socioeconomics, including environmental justice; cultural resources; air quality and noise; reliability and safety; and cumulative impacts.

This EIS was prepared with the assistance of cooperating agencies including the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), and the City of New York. A cooperating agency is another agency participating in the NEPA process that has jurisdiction by law over all or part of a project and/or one that has special expertise with respect to environmental issues associated with a project. Cooperating agencies are intended to have a substantial role in the environmental analysis according to their particular jurisdiction or expertise. The roles of the FERC and the cooperating agencies are described in the following sections.

1.2.1 Federal Energy Regulatory Commission

The FERC is an independent federal regulatory agency responsible for evaluating applications for authorization to construct and operate facilities for transporting natural gas in interstate commerce. Under the Energy Policy Act of 2005, the FERC is the lead federal agency responsible for preparing this EIS in compliance with the requirements of NEPA, the CEQ regulations for implementing the procedural provisions of NEPA, and FERC's regulations for implementing NEPA.

This EIS presents our review of potential environmental impacts associated with the NESE Project, and reasonable recommendations to avoid or mitigate impacts. This EIS will be used as one element in the Commission's review of the Project. The Commission will also consider non-environmental issues including technical competence, financing, rates, market demand, gas supply, long-term feasibility, and other issues. In deciding whether to authorize major new natural gas transportation facilities, the Commission balances public benefits against potential adverse consequences. The Commission's goal is to give appropriate consideration in evaluating proposals for new facilities to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicants' responsibility for unsubscribed capacity, and the avoidance of unnecessary disruptions to the environment and the exercise of eminent domain. If the Commission determines that the Project is required by the public convenience and necessity, a Certificate would be issued under section 7(c) of the NGA and 18 CFR 157 of the Commission's regulations. Environmental impact assessment and mitigation development are important factors in the overall public interest determination.

The Commission may impose conditions on any Certificate granted for the NESE Project. These conditions could include requirements and mitigation measures identified in this EIS to minimize environmental impacts associated with the Project (see section 5.2). We will recommend to the Commission that these requirements and mitigation measures (indicated with bold type in the text) be included as conditions to any approving Certificate issued for the Project. Further, Transco would be required to implement the construction procedures and mitigation measures it has proposed in its filings with FERC, including those in the appendices of this EIS, unless specifically modified by other Certificate conditions.

As applicable, this EIS is also intended to fulfill any cooperating federal agency's NEPA obligations in accordance with NEPA and CEQ regulations. Other regulatory agencies also may include terms and conditions or stipulations as part of their permits or approvals. While there would be jurisdictional differences between FERC's and other agencies' conditions, Transco's environmental inspection program for the Project would address all environmental or construction-related conditions, or other permit requirements placed on the Project by all regulatory agencies.

1.2.2 U.S. Environmental Protection Agency

The proposed Quarryville Loop and existing Compressor Station 200 are within EPA Region 3, and new Compressor Station 206, the Madison Loop, and the Raritan Bay Loop are within EPA Region 2.

The EPA is a federal agency responsible for protecting human health and safeguarding the natural environment by setting and enforcing national standards under a variety of environmental laws and regulations in consultation with state, tribal, and local governments. The EPA has elected to cooperate in the preparation of the EIS because it has environmental permitting and review responsibilities as discussed below and expertise regarding certain resources that would be affected by the NESE Project.

The EPA has delegated the authority to issue water quality certifications under section 401 of the Clean Water Act (CWA) to the Pennsylvania Department of Environmental Protection (PADEP), the New Jersey Department of Environmental Protection (NJDEP), and the New York State Department of Environmental Conservation (NYSDEC), but the EPA may assume this authority if the state program is not functioning adequately, or at the request of a state. The EPA also has the authority to review and veto CWA section 404 permits issued by the USACE in Pennsylvania and New York, or by the NJDEP in New Jersey (see section 1.2.3). Permits issued by the USACE under section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) for the ocean disposal of dredged material are subject to EPA review and concurrence. The EPA also oversees the issuance of National Pollutant Discharge Elimination System (NPDES) permits by state agencies for activities involving the discharge of pollutants into waterbodies.

The EPA also has jurisdictional authority to control air pollution under the Clean Air Act (CAA) (Title 42 United States Code Chapter 85 [42 USC 85]) by developing and enforcing rules and regulations for entities that emit toxic substances into the air. The EPA has delegated the authority to implement these regulations to state and local agencies, who are also allowed to develop their own regulations for non-major sources. The EPA also establishes general conformity applicability thresholds, with which a federal agency can determine whether a specific action requires a general conformity assessment.

In addition to its permitting responsibilities, the EPA is required under section 309 of the CAA to review and publicly comment on the environmental impacts of major federal actions including actions that are the subject of draft and final EISs, and is responsible for implementing certain procedural provisions of NEPA (e.g., publishing the Notices of Availability of the draft and final EISs in the Federal Register) to establish statutory timeframes for the environmental review process.

1.2.3 U.S. Army Corps of Engineers

The NESE Project would be within the regulatory boundaries of the Baltimore, Philadelphia, and New York Districts of the USACE. More specifically, the Quarryville Loop is within the Baltimore District; existing Compressor Station 200 is within the Philadelphia District; and the Madison Loop, Raritan Bay Loop, and new Compressor Station 206 occur within the New York District.

The USACE is a federal agency responsible for regulating the discharge of dredged or fill material into waters and wetlands of the United States under CWA section 404 as codified in 33 USC 1344 and under section 103 of the MPRSA; any work or the construction of any structures that potentially affect the navigable capacity of a waterbody under section 10 of the Rivers and Harbors Act (RHA) as codified in 33 USC 403; and any modifications, alterations, or occupation of public works projects under section 14 of the RHA as codified in 33 USC 408. In New Jersey, the EPA approved the NJDEP's assumption of the section 404 permit program from the USACE in most areas but retains oversight authority of the program in cooperation with the state. More specifically, the NJDEP and USACE share jurisdiction in areas below the head of tide and wetlands adjacent to those waters up to 1,000 feet inland as well as in interstate wetlands and waters along the borders with Pennsylvania and New York. The USACE retains section 10 and section 14 permitting authority in New Jersey and section 404, section 10, and section 14 permitting authority in Pennsylvania and New York.

The USACE has elected to cooperate in the preparation of this EIS because it must comply with the requirements of NEPA before issuing permits under these statutes. As an element of its review, the USACE will consider whether Transco's proposal represents the least environmentally damaging, practicable, alternative pursuant to section 404(b)(1) guidelines. The term "practicable" means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall purpose of the Project. The USACE will adopt this EIS per 40 CFR 1506.3 if, after an independent review of the document, it concludes that its comments and suggestions have been satisfied.

Although the EIS addresses environmental impacts associated with the NESE Project as they relate to USACE's jurisdictional permitting authority, it does not serve as a public notice for any USACE permits or take the place of the USACE's permit review process. In June 2017, Transco submitted applications for section 404, section 10, and section 14 permits to the USACE Districts involved in the Project, and in September 2017, Transco submitted an application to the USACE New York District to dispose of material dredged during construction of the Raritan Bay Loop under section 103 of the MPRSA. After review of Transco's applications, public comments, and the final EIS, the USACE will document its permit decisions, including any required mitigation commitments, in a Record of Decision or similar issuance.

1.2.4 The City of New York

The City of New York is a municipal corporation. The City, acting through its agencies, has agreed to participate as a cooperating agency in the preparation of this EIS. The New York City Mayor's Office of Environmental Coordination is serving as the City's liaison in this process.

1.3 PUBLIC REVIEW AND COMMENT

On May 9, 2016, Transco filed a request to implement the Commission's pre-filing process for the Project. FERC established the pre-filing process to encourage early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve environmental issues before an application is filed with FERC and facility locations are formally proposed. On May 18, 2016, FERC granted Transco's request and established a pre-filing Docket Number (PF16-5-000) to place information filed by Transco, comments by stakeholders, and documents issued by the FERC, into the public record.

Prior to and during the pre-filing process, Transco contacted federal, state, and local agencies to inform them about the Project and to discuss project-specific issues and concerns. Transco also developed a Stakeholder Outreach Plan to facilitate stakeholder communications and make information available to the public and regulatory agencies. The Stakeholder Outreach Plan established points of contact within Transco for the public or agencies to call or e-mail with questions or concerns; provided a publicly accessible website with information about the Project (including overview maps) and project status; and included periodic mailings to affected landowners and other interested parties.

Transco initiated contact with potentially affected landowners prior to entering the FERC pre-filing process. These initial contacts were in the form of a letter describing the Project and seeking permission to conduct environmental and cultural resource surveys on landowner property. Transco has indicated that it continues to communicate with landowners regularly and as needed via mail, telephone, email, and in person.

Transco hosted four public open houses in the NESE Project area in June 2016 including in Lancaster County, Pennsylvania (approximately 35 attendees); Old Bridge Township, Middlesex County, New Jersey (approximately 25 attendees); Franklin Township, Somerset County, New Jersey (approximately 250 attendees); and Brooklyn, Kings County, New York (approximately 15 attendees). The purpose of the open houses was to inform landowners, government officials, and the general public about the Project and invite them to ask questions and express their concerns. FERC staff participated in the meetings and provided information regarding NEPA and the FERC's environmental review process.

On August 24, 2016, the FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Northeast Supply Enhancement Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Sessions* (NOI). The NOI was published in the Federal Register on August 30, 2016[8] and mailed to 1,865 interested parties, including federal, state, and local agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners; local libraries and newspapers; and other stakeholders who had indicated an interest in the Project. The NOI briefly explained the pre-filing process, generally described the Project, provided a preliminary list of issues identified by the FERC staff, requested written comments from the public, announced the time and location of public scoping comment sessions, and asked other federal, state, and local agencies with jurisdiction and/or special expertise to cooperate with the FERC in the preparation of the EIS. Issuance of the NOI also opened a 30-day formal scoping period for filing written comments.

We held four public scoping sessions in September 2016 to provide an opportunity for agencies, stakeholders, and the public to learn more about the NESE Project and participate in the environmental analysis by commenting on the issues to be addressed in the EIS. The scoping sessions were held in Quarryville, Pennsylvania (approximately 10 attendees); Somerset, New Jersey (approximately 275 attendees); Old Bridge, New Jersey (approximately 50 attendees); and Brooklyn, New York (approximately 15 attendees). A total of 147 attendees provided verbal comments to FERC representatives, including 127 attendees at the session in Somerset, New Jersey. Transcripts of the public scoping sessions, and any written comments received after Transco filed its pre-filing request, are part of the public record for the Project and are available for viewing on the FERC internet website (http://www.ferc.gov).[9]

On January 10 and August 8, 2017, we mailed brochures to update stakeholders on the status of the environmental review, summarize major environmental issues identified to-date, identify next steps in the review process, and explain how interested parties can stay informed and continue to provide comments to the FERC.

Transco filed its formal application with the FERC on March 27, 2017. On April 6, 2017, the FERC issued a *Notice of Application* indicating a date of April 27, 2017 for filing comments or requesting intervener status[10] on the Project. The *Notice of Application* was published in the Federal Register on April 12, 2017.[11]

During our pre-filing review, we held frequent teleconferences and/or meetings with interested federal, state, and local environmental permitting agencies to discuss the Project, the FERC's environmental review process, and issues that should be addressed in the EIS. Federal agency meeting and conference call attendees periodically included the USACE; EPA; U.S. Fish and Wildlife Service (FWS); U.S. Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA); National

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8 81 Fed. Reg. 59,618 (2016).

9 Public scoping session transcripts, comments letters, FERC issuances, information filed by Transco, and other documents are available for review on the FERC Internet website (http://www.ferc.gov). Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket No." field (i.e., PF16-5 for records prior to Transco's application or CP17-101 for records after Transco's application). Be sure to select an appropriate date range.

10 A person that is granted intervener status in accordance with the Commission's regulations under 18 CFR 385.214 or 385.211 and regulations under the NGA at 18 CFR 157.10 becomes a party to the proceedings and will have the right to seek court review of Commission orders in this proceeding.

11 82 Fed. Reg. 17,651 (2017).

Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS); and U.S. Coast Guard (USCG). Pennsylvania agency participants included the PADEP, Pennsylvania Department of Conservation and Natural Resources (PADCNR), Pennsylvania Game Commission (PAGC), Pennsylvania Fish and Boat Commission (PAFBC), Pennsylvania State Historic Preservation Office (SHPO), the Susquehanna River Basin Commission, and the Lancaster County Conservation District. New Jersey agency participants included the NJDEP, the New Jersey SHPO, and the Freehold Conservation District. New York agency participants included the NYSDEC, New York Department of State (NYSDOS), New York Office of General Services, the New York SHPO, and the New York City Mayor's Office of Environmental Coordination. The New York and New Jersey Port Authority (NYNJPA) also periodically attended these meetings. As discussed in section 4.9, we also communicated with federally recognized Native American tribes with interest in the Project area. Records of our meetings with agencies and communications with Native American tribes are available for viewing on the Project docket.

Table 1.3-1 lists the environmental issues that were identified during the formal scoping period and indicates the section of the EIS in which each issue is addressed. In addition to verbal comments received at the public scoping sessions, nearly 2,300 written comment submissions were filed with the FERC and placed in the public record for the Project. Table 1.3-1 also lists relevant environmental issues raised after the close of the formal scoping period, including by over 2,000 individuals and organizations requesting to be interveners in the Commission's proceeding. Additional issues we independently identified are also addressed in the EIS.

Approximately 80 percent of all comments received that expressed concern with a specific element of the NESE Project pertained to proposed Compressor Station 206 and were filed by residents, government officials, elected representatives, and other stakeholders near the proposed compressor station. In addition to summarizing general comments by resource, table 1.3-1 lists the specific comments related to Compressor Station 206 as well as the other NESE Project components.

The Commission issued a *Notice of Availability of the Draft Environmental Impact Statement for the Proposed Northeast Supply Enhancement Project* on March 23, 2018. The draft EIS was filed with the EPA, and a formal notice of availability was issued in the Federal Register on March 30, 2018, indicating that the draft EIS was available.[12] The draft EIS was mailed to 2,595 federal, state, and local government agencies; elected officials; Native American tribes; affected landowners; local libraries and newspapers; intervenors in the FERC's proceeding; and other interested parties (i.e., individuals who provided scoping comments or asked to be on the mailing list). The distribution list was included as appendix A of the draft EIS. The notice of availability established a comment period on the draft EIS that ended on May 14, 2018. The notice described procedures for filing comments on the draft EIS and how information about the Project could be found on the FERC's website.

[12] 83 Fed. Reg. 13,741 (2018).

TABLE 1.3-1

Environmental Issues and Concerns Raised During Public Scoping for the Northeast Supply Enhancement Project

Issue/Concern	EIS Section Addressing Issue
GENERAL	
No need for the Project	1.3
FERC outreach efforts and scoping process were inadequate	1.3
Evaluate impacts associated with natural gas production, including fracking	1.3
Transco segmented projects in the region to minimize environmental review	1.3
Describe the proposed facilities, project schedule, land requirements, construction methods, construction monitoring, and post-construction monitoring	2.0
Describe landowner notification and dispute resolution procedures	2.5.4, 4.7.3
Evaluate cumulative impacts	4.12
Describe future expansion or abandonment plans	4.12
GEOLOGY	
Impacts on geological resources	4.1
Geologic hazards including seismic activity, and hazard mitigation	4.1.4
SOILS	
Potential for soil erosion to occur and measures to reduce erosion	4.2.1.1, 4.2.1.3
Potential for soil contamination from construction and operation of the proposed facilities	4.2.1.2
WATER RESOURCES	
Impacts on groundwater, springs, wells, and drinking water supplies	4.3.1
Impacts of herbicide use on groundwater and surface waters	4.3.1, 4.3.2
Water requirements during construction, including hydrostatic testing	4.3.2.6
Describe measures to avoid/reduce impacts on wetlands, including vernal pools	4.3.4
Need for compensatory wetland mitigation	4.3.4.3
VEGETATION	
Impacts from herbicide use	4.4.3, 4.4.4
Impacts on pollinators and pollinator habitat	4.5.1.1
WILDLIFE	
Impacts on wildlife and their habitat, including wetlands	4.5.1.1
Air quality and noise impacts on wildlife	4.5.1.1, 4.5.2.8, 4.5.3.2
SPECIAL STATUS SPECIES	
Potential impacts on federally listed or proposed threatened or endangered species or their critical habitat	4.6.3
Impacts on state-listed species of concern	4.6.4
LAND USE, RECREATION, AND VISUAL RESOURCES	
Impacts on agricultural land and activities, including livestock and organic farming	4.7.1.1
Legality of eminent domain; infringement on private property rights	4.7.2
Easement and compensation process	4.7.2
Impacts on residences, business, and schools during construction and operation, including landowner access	4.7.3, 4.7.5
Impacts on housing developments under construction	4.7.4
Impacts on future developments	4.7.4
Proximity to quarry	4.7.4
Impacts on recreational areas, offshore recreational activities in Raritan Bay	4.7.5
Impacts of construction on known hazardous waste sites	4.7.8
SOCIOECONOMICS	
Economic benefits will only be short term	4.8.2, 4.8.9
Economic benefits to local communities	4.8.2, 4.8.9

TABLE 1.3-1 (cont'd)

Environmental Issues and Concerns Raised During Public Scoping for the Northeast Supply Enhancement Project

Issue/Concern	EIS Section Addressing Issue
Impact on law enforcement and emergency response services during construction and operation	4.8.4
Impacts on schools in the project area	4.8.4
Adverse economic impacts on local tourism activities	4.8.5
Impacts on existing roads, infrastructure, and pedestrians from construction traffic	4.8.7
Impacts on traffic and roads during operation	4.8.7
Impacts on property values/resale ability and property insurance coverage/rates	4.8.8
Impacts on local tax revenues from reduced property values	4.8.8, 4.8.9
Impacts on Environmental Justice communities	4.8.10
CULTURAL RESOURCES	
Impacts on known and undiscovered cultural resources and historic landscapes	4.9.1
Impacts on historic structures and farms	4.9.1
Impacts on historic districts	4.9.1
Impacts on Native American traditional lands	4.9.2.1
AIR QUALITY AND NOISE	
Identify air quality regulations	4.10.1
Identify measures to reduce construction and operation emissions	4.10.1.5
Impacts on air quality during construction and operation	4.10.1.5, 4.10.1.6
Health effects of air emissions, including from pipeline leaks	4.10.1.6
RELIABILITY AND SAFETY	
Pipe materials specification	2.3.1, 4.11.1
Use of odorants in the natural gas	4.11
Notification in the event of a pipeline incident	4.11.1
Consistency with New Jersey safety class location designations	4.11.1
Pipeline monitoring during operation; safety oversight; frequency of monitoring	4.11.1
Emergency response procedures and the capabilities of local emergency service providers	4.11.1
Safety impacts in populated areas	4.11.1, 4.11.2, 4.11.3
Risk of safety incident due to Transco safety record	4.11.2
Risk of safety incident due to increased pressure on existing pipelines	4.11.2
Potential impacts from terrorist acts	4.11.5
CUMULATIVE IMPACTS	
Evaluate cumulative impacts associated with natural gas production	4.12.1.1
Evaluate the potential for increased greenhouse gas emissions to contribute to global warming	4.12.4
Potential impact of rising sea level and increased storm frequency	4.12.4
ALTERNATIVES	
Consider the use of renewable energy and energy conservation alternatives	3.0
Consider the use of other existing pipeline systems in the region	3.2.1
Consider pipeline route alternatives to avoid sensitive features and developed areas	3.3
COMMENTS SPECIFIC TO PROJECT FACILITIES	
QUARRYVILLE LOOP	
Minimize impacts on forested land near milepost (MP) 1682.0	4.4.4
Project would impact Muddy Run Important Bird Area	4.5.1.2
Safety concerns including potential impact radius	4.11.1
MADISON LOOP	
Construction impacts on existing roads, railroads, and utilities	4.7.1.1, 4.8.7
Impacts on the La Mer planned development near MP 11.1	4.7.4
RARITAN BAY LOOP	
Consider onshore route alternatives to avoid or minimize offshore impacts	3.3

TABLE 1.3-1 (cont'd)

Environmental Issues and Concerns Raised During Public Scoping for the Northeast Supply Enhancement Project

Issue/Concern	EIS Section Addressing Issue
Consider offshore route alternatives to avoid or minimize onshore impacts	3.3
Impact of sedimentation on water quality	4.3.3
Impact of disturbing contaminated sediments on aquatic species and habitat	4.5.2.8
Impact of marine construction traffic on aquatic species	4.5.2.8
Impact of construction noise on aquatic species	4.5.2.8
Impacts on recreation on the waterfront and in Raritan Bay	4.7.5.2, 4.8.5.2
Impacts on marine traffic, including ferry routes	4.7.7, 4.8.7.3
Impacts on Raritan Bay tourism	4.8.5.2
Impacts on fishing activities and oyster seeding projects on Raritan Bay	4.8.6
<u>COMPRESSOR STATION 206</u>	
No benefit to the surrounding community	1.3
FERC outreach efforts and scoping process were inadequate	1.3
Transco should be responsible for upgrading municipal water system and emergency response capability	2.3.4, 4.3.1.7, 4.8.4, 4.11.3
Existing municipal water service in area is inadequate for emergency response	2.3.4, 4.3.1.7, 4.8.4, 4.11.3
Upgrade existing Compressor Stations 205 and/or 207 instead of building new compressor station	3.2.2
Choose a more remote location for Compressor Station 206	3.4.1
Alternate access route for Compressor Station 206	3.4.2
Evaluate the potential cumulative impacts on the local electrical grid from power required by Compressor Station 206	3.5
Utilize electric motor-driven compressors instead of natural gas-fired compressors	3.5
Project will exacerbate groundwater contamination from adjacent Higgins Farm Superfund site	4.3.1.6
Impacts on groundwater resources from hazardous substances spills	4.3.1.8
Impacts on surface water resources at the site and in the area, including on the Delaware and Raritan Canal, Millstone River (which includes Carnegie Lake)	4.3.2
Impacts on wetlands	4.3.4
Impacts on forested land; including habitat fragmentation	4.4.4, 4.5.1.1
Impacts on wildlife, including migratory birds	4.5.1
Impacts on special land uses including organic farms, therapeutic horse riding, parks, nature preserves, and religious sites	4.7.1, 4.7.5
Impacts on planned conversion of Trap Rock Quarry to a reservoir	4.7.4
Impacts on recreation and tourism	4.7.5, 4.8.5
Impacts on the special trails, including the Millstone Valley National Scenic Byway and Washington-Rochambeau Revolutionary Route (Crossroads of the American Revolution)	4.7.5, 4.9.1.1
Visual impacts on nearby receptors including the New Jersey Buddhist Vihara and Meditation Center	4.7.9
Construction traffic and road damage	4.8.7
Impacts on property values	4.8.8
Impacts on local property tax base	4.8.8, 4.8.9
Impacts on local businesses and area reputation	4.8.9
Impacts on Environmental Justice communities	4.8.10
Impacts on cultural resources near the site, including Rockingham House, Higgins Farm, and the Delaware and Raritan Canal	4.9.1.1
Air quality impacts during blowdown events at compressor stations	4.10.1.6
Air impacts, including odors, from compressor station operation	4.10.1.6
Health impacts from compressor station air emissions, including on senior citizens and children	4.10.1.7
Noise-related health impacts from compressor station operation	4.10.2
Impacts from noise, including during blowdown events, on nearby receptors including the New Jersey Buddhist Vihara and Meditation Center	4.10.2.2

TABLE 1.3-1 (cont'd) **Environmental Issues and Concerns Raised During Public Scoping for the Northeast Supply Enhancement Project**	
Issue/Concern	EIS Section Addressing Issue
Vibration impacts from compressor station operation, including health impacts	4.10.2.2
Mitigation measures to reduce or eliminate noise from compressor station operation	4.10.2.2
Road system inadequate for emergency response and resident evacuations	4.11.1
Local emergency response capabilities maybe insufficient in event of a serious incident	4.11.1
Added compression could damage existing pipeline resulting in explosion and fire	4.11.2
Poor Transco safety record increases risk of serious incident	4.11.2
Poor industry safety record indicates high risk of serious incident	4.11.3
Increased safety risk due to many homes, schools, and churches in the area	4.11.3
Potential for blasting related vibrations from Trap Rock Quarry to damage the compressor station resulting in explosion and fire	4.11.4
Cumulative impacts from compressor station operation and the Trap Rock Industries quarry, including Trap Rock Industries trucks	4.12.3.12
Potential for compressor station operation to increase ambient temperature	4.12.4

We held four public comment sessions during the draft EIS comment period. The comment sessions were held in April and May 2018 in Old Bridge and Somerset, North Jersey; Quarryville, Pennsylvania; and Brooklyn, New York. The comment sessions provided interested parties with an opportunity to present verbal comments on our analysis of the environmental impacts of the Project as described in the draft EIS. A total of 232 people commented at the sessions. In addition, 1,765 parties submitted a total of 2,245 letters in response to the draft EIS. Multiple form letters and petitions were also submitted in response to the draft EIS, as well as motions to intervene filed by 210 parties. The most commonly received comments on the draft EIS related to impacts on the aquatic environment from construction of the Raritan Bay Loop, impacts associated with construction and operation of Compressor Station 206, as well as general comments regarding the FERC process and the purpose and need for the Project. All environmental comments on the draft EIS that were received through mid-December 2018 have been addressed in this final EIS. A transcript of each comment session and copies of each written comment are part of the public record for the Project. Our responses to relevant comments are provided in appendix M of this final EIS. A subject index is provided in appendix N. Substantive changes in the final EIS are indicated by vertical bars that appear in the margins. The changes were made both in response to comments received on the draft EIS and as a result of updated information that became available after the issuance of the draft EIS.

The Commission issued a *Notice of Draft General Conformity Determination for the Northeast Supply Enhancement Project* on September 18, 2018. The notice established a 30-day public comment period and was placed on our website, mailed to 6,851 stakeholders, and published in newspapers in the Project area. Comments on the draft General Conformity Determination were received from four individuals, the EPA, the NJDEP, the NYSDEC, and the Eastern Environmental Law Clinic, and are addressed in the final General Conformity Determination (see appendix I) and the responses to comments on the draft EIS and draft General Conformity Determination in appendix M.

The Commission's notice of availability for this final EIS is being mailed to the agencies, tribes, individuals, and organizations on the distribution list provided in appendix A. The notice of availability includes information on how this final EIS may be viewed and downloaded from the FERC website. This final EIS was filed with the EPA for issuance of a formal public notice of availability in the Federal Register. In accordance with CEQ's regulations implementing NEPA, no agency decision on a proposed action may be made until 30 days after the EPA publishes a notice of availability for this final EIS. However, the CEQ regulations provide an exception to this rule when an agency decision is subject to a formal internal process that allows other agencies or the public to make their views known. In such cases, the agency decision may be made at the same time the notice of this final EIS is published, allowing both periods to run concurrently. Should the Commission issue a Certificate to Transco for the proposed action, it would be subject to a 30-day rehearing period. Therefore, the Commission could issue its decision concurrently with issuance of the final EIS.

We received comments expressing concern that the FERC's outreach efforts were inadequate, thereby reducing public input in our environmental review process. More specifically, commenters contend that our use of a 0.5-mile radius to identify potentially affected landowners around proposed Compressor Station 206 was insufficient; that the number, location, and format of scoping sessions limited attendance and comment; and that the time allowed for filing comments was too brief. In response to these concerns, we note that our environmental mailing list complies with 18 CFR 157.6 and includes 693 landowners, including 134 landowners near Compressor Station 206, as well as local government officials and area media outlets. The mailing list was used to distribute Project notices and newsletters, and these documents were also posted on the NESE Project docket which is readily accessible through our website. Although 134 landowners were identified within 0.5 mile of proposed Compressor Station 206, we note that over 2,000 individuals cited proximity to the proposed site or concerns related to the facility in their motions to intervene in the proceeding and those individuals were added to the service list to be notified of all Commission issuances in this proceeding. Regarding the location of the NESE Project scoping sessions, the sessions were held at venues between 1 and 7 miles from the four new components of the Project (Quarryville Loop, Madison Loop, Raritan Bay Loop, and Compressor Station 206). In addition to proximity to the proposed facilities, scoping session venues were selected based on availability, capacity, layout, and other factors. As noted above, the scoping sessions were announced in advance and were attended by approximately 350 people, with 147 individuals providing verbal comments, including 127 individuals at the session nearest to proposed Compressor Station 206. The public comment sessions on the draft EIS were also held in proximity to the proposed facilities and, as noted above, 233 individuals provided verbal comments at these meetings. Formal periods for providing scoping comments, comments on Transco's application, and comments on the draft EIS closed on specified dates as described above.

After issuance of the draft EIS, several commenters stated that the NJDEP should have participated in our environmental review process. As noted above, the NJDEP assisted in our review of the NESE Project during our pre-filing process, including hosting an interagency meeting in Trenton, New Jersey on September 22, 2016. On April 17, 2017 the NJDEP elected to file as an intervenor in the NESE Project proceeding, after which the NJDEP could no longer participate in the environmental review process as a formal cooperating agency. However, the NJDEP continued to file comments on our docket, including comments on the draft EIS, which further informed the environmental review presented in this final EIS.

During the pre-filing process, we received comments asserting that Transco intentionally delayed the release of information about the Project, thereby limiting stakeholders' ability to meaningfully engage and comment on the Project. The Commission encourages applicants to work with affected landowners and other stakeholders. As previously noted, the purpose of the FERC's pre-filing process is for the applicant to obtain agency and public input prior to finalizing its proposal in order to avoid or minimize environmental impacts if the project is approved. Therefore, detailed facility designs, locations, and estimated environmental impacts (wetland impacts, air emissions, etc.) are typically not available until submittal of the FERC application.

We also received comments recommending that environmental impacts associated with natural gas production, including the practice of hydraulic fracturing (fracking), be evaluated in our review. In previous NEPA reviews, FERC assessed the cumulative impact of natural gas production activities where those activities occurred within the geographic scope of facilities under our jurisdiction. However, the nearest active natural gas production to the proposed facilities is in northeastern Pennsylvania, approximately 80 miles from the Quarryville Loop (PADEP, 2017a). The permitting of natural gas production facilities is under the jurisdiction of the states and federal resource or land management agencies where those facilities are located, and not under the jurisdiction of the FERC. The development of Appalachian Basin natural gas, as regulated by the states, continues to drive the need for takeaway interstate pipeline capacity to allow the gas to reach markets; therefore, companies are planning and building interstate transmission facilities in response to this gas supply. In addition, many production facilities have already been permitted and/or constructed in the region, creating a network through which natural gas may flow along various pathways to local users or interstate pipeline systems. For these reasons, we do not examine environmental impacts associated with natural gas production in this EIS. That is not to say that the environmental impact of individual production facilities is not assessed under the jurisdiction of other permitting agencies, such as the USACE or state agencies.

Numerous New Jersey residents filed comments expressing a perceived lack of quality with the reproductions they received of Transco's applications to the NJDEP for freshwater wetland and flood hazard permits. Most of these comments were directed to the NJDEP and requested that NJDEP extend the public comment period or hold additional public comment meetings on the permit applications. Several of the commenters also noted that Transco had utilized outdated aerial photography in certain depictions of proposed Compressor Station 206 provided to the FERC. Regarding the quality of graphics included in Transco's NJDEP applications, the NJDEP replied to one commenter in Accession No. 20170725-5017 on our docket that Transco's applications complied with NJDEP requirements. We also understand that full copies of the NJDEP applications are available for public review. Regarding Transco's use of outdated aerial photography, we note that FERC staff visited the vicinity of Compressor Station 206, including the surrounding residential neighborhoods. Based on these site visits, we are familiar with the level of development and proximity of homes to the proposed site and we determined that the aerial imagery accurately depicts the nearest noise sensitive areas (NSAs) within 0.5 mile of the compressor station site. Furthermore, Transco filed updated aerial imagery for Compressor Station 206 that complies with our regulations at 18 CFR 380.12(c)(3)(ii).[13]

We received numerous comments from individuals and elected officials in proximity to proposed Compressor Station 206 in Somerset County, New Jersey, who oppose the Project, in part, because they perceive no benefit to their communities as the natural gas transported by the Project would be delivered to New York City. While the Project is not designed to provide affected landowners and communities in New Jersey natural gas directly, section 4.8 describes the employment, tax, and other economic benefits that local jurisdictions and businesses along the entire Project route would receive if the Project is approved and constructed. We also note that natural gas transmission pipelines typically cross many private and public lands and government jurisdictions without direct connection to the facilities. New Jersey benefits from this characteristic of the nation's interstate natural gas transmission system as New Jersey does not produce any natural gas but ranked 10th in the nation in natural gas consumption between 1997 and 2015. During this period, New Jersey consumed approximately 12.3 trillion cubic feet of natural gas (U.S. Energy Information Administration (EIA), 2017).

We also received comments that the Project is not necessary because the natural gas that would be transported by the Project could be delivered to New York City through other, existing pipeline systems, or that renewable sources of energy could be utilized to meet the energy capacity of the Project. The potential to utilize alternative sources of energy or other, existing pipeline systems in the region to meet the purpose and need of the Project are discussed in section 3.0.

[13] Updated aerial photography depicting Compressor Station 206 can be found on FERC's eLibrary (https://www.ferc.gov/docs-filing/elibrary.asp) by conducting an "Advance Search" for Accession No. 20180511-5170; under the Files, select the file titled "15_Vol_1_NESE_Environ_Rpts_Att_8_Part_1_LARGE.PDF."

Several commenters also contend that Transco has segmented the expansion of its interstate transmission system in the region to avoid or minimize environmental scrutiny. In its application, Transco states that National Grid expressed a need for the additional natural gas capacity provided by the NESE Project to meet customer demand in time for the 2019/2020 winter heating season, and that the proposed facilities are necessary to meet this demand. In addition, we evaluated the potential environmental impacts of the Project in this EIS, rather than a less robust Environmental Assessment, and in section 4.12 we consider the cumulative impact of Transco's proposal with other natural gas transmission projects in the region.

1.4 NON-JURISDICTIONAL FACILITIES

Under section 7 of the NGA, the FERC is required to consider all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the FERC. These "non-jurisdictional" facilities may be integral to the project objective (e.g., a new or expanded power plant that is not under the jurisdiction of the FERC at the end of a pipeline) or they may be merely associated as minor, non-integral components of the jurisdictional facilities that would be constructed and operated with the proposed facilities (e.g., a meter station constructed by a customer of the pipeline to measure gas off-take).

The non-jurisdictional facilities associated with the NESE Project are summarized in table 1.4-1. We discuss these facilities in our cumulative impacts assessment in section 4.12.

TABLE 1.4-1

Non-jurisdictional Facilities Associated with the Northeast Supply Enhancement Project

NESE Project Facility	Utility Sponsor	Description
Compressor Station 200	PECO Energy Company	Approximately 0.9 mile of new electrical service extending from an existing PECO Energy Company substation along an existing right-of-way adjacent to Compressor Station 200. Modifications to PECO Energy Company's existing infrastructure are expected to be minor, potentially including the replacement/addition of poles in their existing utility corridor. PECO Energy Company would permit, construct, own, operate, and maintain any new facilities.
Compressor Station 206	Public Service Electric and Gas Company (PSE&G)	PSE&G would bury the necessary electric distribution line within the right-of-way for the proposed 3,300-foot-long access road to the site. PSE&G would permit, construct, own, operate, and maintain the new facility.
	Franklin Township	Franklin Township plans to improve the existing municipal water service near Compressor Station 206 and would install a potable water line within the right-of-way for the proposed 3,300-foot-long access road to the site, potentially below the road. Franklin Township would permit, construct, own, operate, and maintain the utility.

1.5 PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

FERC and other federal agencies that must make a decision on the Project are required to comply with federal statutes including section 7 of the Endangered Species Act of 1973 (ESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Marine Mammal Protection Act of 1972 (MMPA), section 307 of the Coastal Zone Management Act (CZMA), and section 106 of the National Historic Preservation Act (NHPA). These and other applicable statutes have been considered in the preparation of this EIS.

A list of major environmental permits, approvals, and consultations for the Project is provided in table 1.5-1. Transco would be responsible for obtaining all applicable permits and approvals to construct and operate the Project regardless of whether they appear in this table or not. FERC encourages cooperation between Transco and state and local authorities; however, state and local agencies, through the application of state and local laws, may not prohibit or unreasonably delay the construction or operation of facilities approved by FERC. Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any authorization issued by FERC.[14]

TABLE 1.5-1

Major Environmental Permits, Licenses, Approvals, and Consultations for the Northeast Supply Enhancement Project

Agency	Permits/Reviews	Project Component	Submitted Date *(Anticipated)*	Receipt Date *(As anticipated by Transco)*
FEDERAL				
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity	All	March 27, 2017	*Pending*
U.S. Army Corps of Engineers	Section 404 Clean Water Act (CWA)/Section 10 Rivers and Harbors Act	All	Quarryville Loop: June 16, 2017	May 29, 2018
			Madison Loop and Raritan Bay Loop: June 27, 2017; September 15, 2017; December 22, 2017; October 5, 2018 (supplements)	*April 2019*
			Compressor Station 200: September 2017	September 2017
	Section 408 Review	Raritan Bay Loop	June 27, 2017	*April 2019*
	Section 103 of the Marine Protection, Research, and Sanctuaries Act to transport dredged materials for disposal	Raritan Bay Loop	September 13, 2017	*January 2019*
U.S. Coast Guard	Notice to Mariners	Raritan Bay Loop	*Q1 2020*	*Q1 2020*
	Aids to Navigation and Obstructions		*Q1 2020*	*Q1 2020*
U.S. Fish and Wildlife Service, New Jersey and Pennsylvania Field Offices	Consultations for Section 7 Endangered Species Act Migratory Bird Treaty Act, Bald and Gold Eagle Protection Act, and Fish and Wildlife Coordination Act clearances	Quarryville Loop, Madison Loop, Compressor Station 206, Compressor Station 200	June 2016	April 17, 2018 and May 7, 2018

[14] *See* 15 USC § 717r(d) (state or federal agency's failure to act on a permit considered to be inconsistent with Federal law); *see also Schneidewind v. ANR Pipeline Co*., 485 U.S. 293, 310 (1988) (state regulation that interferes with FERC's regulatory authority over the transportation of natural gas is preempted) and *Dominion Transmission, Inc. v. Summers*, 723 F.3d 238, 245 (D.C. Cir. 2013) (noting that state and local regulation is preempted by the NGA to the extent it conflicts with federal regulation, or would delay the construction and operation of facilities approved by the Commission).

TABLE 1.5-1 (cont'd)

Major Environmental Permits, Licenses, Approvals, and Consultations for the Northeast Supply Enhancement Project

Agency	Permits/Reviews	Project Component	Submitted Date *(Anticipated)*	Receipt Date *(As anticipated by Transco)*
National Oceanic and Atmospheric Administration – National Marine Fisheries Service	Incidental Harassment Authorization (IHA) under Marine Mammal Protection Act	Raritan Bay Loop	Consultation initiated June 2016; draft IHA application submitted June 6, 2017; July 25, 2018 (revised)	*June 2019*
	Magnuson-Stevens Fishery Conservation and Management Act clearance (Essential Fish Habitat (EFH))		Consultation initiated June 2016; draft EFH assessment submitted June 6, 2017	*January 2019*
	Section 7 Endangered Species Act clearance		Consultation initiated December 2016	*January 2019*
U.S. Environmental Protection Agency	CWA – National Pollutant Discharge Elimination System (NPDES)	All	*See state requirements below*	*12-18 months from submittal date*
	Clean Air Act – General Conformity		March 27, 2017	Cooperated in General Conformity Determination
STATE				
New Jersey				
New Jersey Department of Environmental Protection (NJDEP) Coastal Management Program	Concurrence with Applicant's Coastal Zone Management Act (CZMA) Consistency Assessment	Madison Loop, Raritan Bay Loop	June 20, 2018 (resubmittal)	*April 2019*
NJDEP Land Use Regulation Program	Waterfront Development Individual Permit	Madison Loop, Raritan Bay Loop	June 20, 2018 (resubmittal)	*April 2019*
	Water Quality Certificate under Section 401 of the federal CWA	Madison Loop, Raritan Bay Loop, Compressor Station 206	Concurrent with Waterfront Development, Flood Hazard Area, and Freshwater Wetlands permits review	*April 2019*
	Tidelands Utility License	Raritan Bay Loop	July 18, 2017	*June 2019*
	Release of Conservation Easement – Golden Age Property	Madison Loop	August 2017	*Q4 2018*
	Flood Hazard Area – Authorization, Individual Permit	Madison Loop, Compressor Station 206	June 20, 2018 (resubmittal)	*April 2019*
	Freshwater Wetlands - Transition Area Waiver	Madison Loop, Compressor Station 206	June 20, 2018 (resubmittal)	*April 2019*
	Freshwater Wetlands - Individual Permit	Madison Loop, Compressor Station 206	June 20, 2018 (resubmittal)	*April 2019*
NJDEP Division of Water Quality, Bureau of Surface Water Permitting	Surface Water General Permit - Hydrostatic Test Water Discharges (DG)	Madison Loop, Raritan Bay Loop, Compressor Station 206	*Q1 2020*	*Q1 2020*
	Short-term De Minimis Discharge Permit (B7)	Madison Loop	*Q3 2019*	*Q3 2019*

TABLE 1.5-1 (cont'd)				
Major Environmental Permits, Licenses, Approvals, and Consultations for the Northeast Supply Enhancement Project				
Agency	Permits/Reviews	Project Component	Submitted Date *(Anticipated)*	Receipt Date *(As anticipated by Transco)*
	New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permit will be the BGR – General Groundwater Remediation Cleanup Permit	Madison Loop	*Q2 2019*	*Q3 2019*
NJDEP Division of Water Quality, Bureau of Nonpoint Pollution Control	General Permit for Construction Activity, Storm Water (5G3)	Madison Loop, Raritan Bay Loop, Compressor Station 206	*Q1 2019*	*Q1 2019*
NJDEP Division of Water Supply and Geoscience	Consultation for drinking water information	Madison Loop, Compressor Station 206	August 2016	N/A
NJDEP Division of Water Supply and Geoscience – Bureau of Water Allocation and Well Permitting	Short-Term Water Use Permit-by-rule (BWA-003) – for hydrostatic testing activities	Madison Loop, Raritan Bay Loop	*Q1 2020*	*Q1 2020*
	Temporary Dewatering Permit (BWA-002) – Old Bay Township	Madison Loop	March 15, 2018	*Q4 2018*
	Temporary Dewatering Permit (BWA-002) – Sayreville Township	Madison Loop	March 15, 2018	*Q4 2018*
NJDEP Division of Fish and Wildlife, Endangered and Nongame Species Program	Consultation for state-protected species	Madison Loop, Raritan Bay Loop, Compressor Station 206	May 2016	N/A
NJDEP Division of Parks and Forestry Natural Heritage Program	Consultation for presence of rare, threatened, and endangered species	Madison Loop, Compressor Station 206	May 2016	N/A
NJDEP Division of Fish and Wildlife, Bureau of Freshwater Fisheries	Consultation for state freshwater fish habitat	Madison Loop, Compressor Station 206	June 2016	N/A
NJDEP Division of Fish and Wildlife, Bureau of Shellfisheries	Consultation for state shellfish habitat	Raritan Bay Loop	June 2016	N/A
NJDEP Division of Fish and Wildlife, Bureau of Marine Fisheries	Consultation for state marine fish habitat	Raritan Bay Loop	June 2016	N/A
NJDEP Historic Preservation Office/Tribal Historic Preservation Officers (THPOs)	Section 106 National Historic Preservation Act (NHPA) cultural resources clearance/ Consultation with Native American Tribes	Madison Loop, Raritan Bay Loop, Compressor Station 206	July 2016	Various (see section 4.9)
NJDEP Bureau of Stationary Sources	Preconstruction Permit to Construct and Operate – Emergency Generator	Compressor Station 206	May 26, 2017	May 26, 2017
NJDEP Bureau of Stationary Sources	Preconstruction Permit to Construct and Operate – Two Mars 100 (or equivalent) 16,000 hp turbines	Compressor Station 206	January 4, 2017	September 7, 2017
NJDEP Bureau of Stationary Sources	General Permit – Condensate Storage Tank	Compressor Station 206	*Q2 2019*	*Q2 2019*
New Jersey Department of Transportation	Highway Occupancy Permit	Madison Loop, Raritan Bay Loop	*Q4 2018*	*Q1 2019*
New Jersey Transit Authority	License to Cross	Madison Loop, Raritan Bay Loop	December 5, 2017	*Q1 2019*

TABLE 1.5-1 (cont'd)

Major Environmental Permits, Licenses, Approvals, and Consultations for the Northeast Supply Enhancement Project

Agency	Permits/Reviews	Project Component	Submitted Date *(Anticipated)*	Receipt Date *(As anticipated by Transco)*
New York				
New York Department of State (NYSDOS)	Consistency with Applicant's CZMA Consistency Assessment (coordinated with New York City Department of City Planning)	Raritan Bay Loop	June 27, 2017; September 18, 2017 and October 5, 2018 (updates)	*March 2019*
New York State Department of Environmental Conservation (NYSDEC)	Section 401 CWA Water Quality Certificate	Raritan Bay Loop	June 27, 2017; May 16, 2018 (resubmittal); May 31, 2018 (supplement)	*April 2019*
	Article 15 – Excavation or Placement of Fill in Navigable Water and Their Adjacent and Contiguous Wetlands Permit	Raritan Bay Loop	June 27, 2017; May 16, 2018 (resubmittal) ; May 31, 2018 (supplement)	*April 2019*
	State Pollutant Discharge Elimination System Permit for Discharges from Hydrostatic Testing of Tanks and Pipelines	Raritan Bay Loop	June 21, 2018	*April 2019*
	Permit for Incidental Take of T&E	Raritan Bay Loop	June 27, 2017; May 16, 2018 (resubmittal) ; May 31, 2018 (supplement)	*April 2019*
NYSDEC Division of Fish, Wildlife and Marine Resources – Bureau of Marine Resources	Consultation (State Shellfish and Marine Fish Habitat; Rare, Threatened and Endangered Marine Species)	Raritan Bay Loop	June 2016	N/A
New York State Historic Preservation Office/THPOs	Section 106 NHPA cultural resources clearance/THPO Letters	Raritan Bay Loop	August 2016	Various (see section 4.9)
New York State Office of General Services	Submerged Lands Easement for Pipeline Under Public Lands Law	Raritan Bay Loop	April 20, 2018	*April 2019*
Pennsylvania				
Pennsylvania Department of Environmental Protection (PADEP), Bureau of Waterways Engineering and Wetlands – Southcentral Region	CWA 401 Water Quality Certification	Quarryville Loop	June 16, 2017; December 11, 2017 (supplement)	May 31, 2018
	PA Code Chapter 105 Water Obstruction and Encroachment Permit	Quarryville Loop	June 16, 2017; August 2, 2017; February 1, 2018; June 27, 2018 (supplement)	August 30, 2018
PADEP, Bureau of Waterways Engineering and Wetlands – Southcentral Region	Individual Permit for Discharges from Hydrostatic Testing of Tanks and Pipelines	Quarryville Loop	March 21, 2018	*Q4 2018*
PADEP, Bureau of Waterways Engineering and Wetlands – Southeast Region	PAG-10 NPDES Permit for Discharges from Hydrostatic Testing of Tanks and Pipelines	Compressor Station 200	Existing authorization covers discharges at existing facilities	NA

TABLE 1.5-1 (cont'd)

Major Environmental Permits, Licenses, Approvals, and Consultations for the Northeast Supply Enhancement Project

Agency	Permits/Reviews	Project Component	Submitted Date *(Anticipated)*	Receipt Date *(As anticipated by Transco)*
Pennsylvania Department of Conservation and Recreation	Consultation (Rare, Threatened, and Endangered Plant and Invertebrate Species)	Quarryville Loop, Compressor Station 200	June 2016	September 26, 2017
Pennsylvania Fish and Boat Commission	Consultation (Rare, Threatened and Endangered Aquatic and Amphibian Species)	Quarryville Loop, Compressor Station 200	June 2016	September 27, 2017
Pennsylvania Game Commission	Consultation (Rare Mammalian and Avian Species)	Quarryville Loop, Compressor Station 200	June 2016	July 11, 2017
Pennsylvania Historical and Museum Commission, Bureau of Historic Preservation/THPOs	Section 106, NHPA Consultation/Consultation with Native American Tribes	Quarryville Loop, Compressor Station 200	July 2016	Various (see section 4.9)
Pennsylvania Bureau of Air Quality	Request for Determination – Electric-Motor Driven Compression	Compressor Station 200	May 17, 2017	June 12, 2017
Pennsylvania Department of Transportation	Highway Occupancy Permit	Quarryville Loop	*Q4 2018*	*Q1 2019*
LOCAL				
New York				
New York City Department of City Planning	New York City Waterfront Revitalization Program Consistency (coordinated with NYSDOS for CZMA review).	Raritan Bay Loop	June 27, 2017	*March 2019 (concurrent with NYSDOS review)*
Pennsylvania				
Lancaster County Conservation District	ESCGP-2	Quarryville Loop	June 16, 2017; October 3, 2017; November 1, 2017; March 13, 2018; June 20, 2018; July 9, 2018 (updates)	August 30, 2018
Chester County Conservation District	ESCGP-2	Compressor Station 200	December 6, 2017; January 19, 2018; April 13, 2018; June 28, 2018; July 9, 2018 (updates)	August 30, 2018
New Jersey				
Freehold Soil Conservation District	E&S	Madison Loop	June 22, 2017	July 28, 2017
	E&S	Raritan Bay Loop	June 22, 2017	August 1, 2017
Somerset-Union Soil Conservation District	E&S	Compressor Station 206	June 22, 2017	March 28, 2018

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 PROPOSED FACILITIES

The NESE Project would consist of 42- and 26-inch-diameter natural gas pipeline loops and ancillary facilities; new aboveground facilities; and modifications to existing aboveground facilities. The proposed facilities are described throughout this section, and the following depictions of the Project are included in this EIS or are available on our docket:

- Figure 1-1 depicts the general locations of the facilities.
- Topographic maps showing the proposed facilities, access roads, and contractor yards are provided in appendix B.
- Detailed aerial photographic-based alignment sheets depicting the proposed facilities and workspaces are available on our website www.ferc.gov.[15]

2.1.1 Pipeline Facilities

The proposed pipeline facilities would consist of the following (see table 2.1.1-1):

- Quarryville Loop: about 10.2 miles of new 42-inch-diameter onshore pipeline adjacent to Transco's existing Mainline[16] system between approximate mileposts[17] (MP) 1681.0 and 1691.2 in Lancaster County, Pennsylvania. The Quarryville Loop would be constructed using overland trenching methods described in section 2.3.1.4.
- Madison Loop: about 3.4 miles of new 26-inch-diameter onshore pipeline adjacent to Transco's existing LNYBL Loop C between approximate MPs 8.6 and 12.0 in Middlesex County, New Jersey. The Madison Loop would be constructed using overland trenching methods except at three locations where the pipeline would be installed using the horizontal directional drilling (HDD) method described in section 2.3.2.1.
- Raritan Bay Loop: about 0.2 mile of new 26-inch-diameter onshore pipeline parallel to Transco's existing LNYBL Loop C in Middlesex County, New Jersey, and about 23.3 miles of new 26-inch-diameter offshore pipeline generally parallel to but offset from Transco's existing LNYBL in Middlesex and Monmouth Counties, New Jersey and Queens and Richmond Counties, New York. The offshore portion of the Raritan Bay Loop would cross about 6.0 miles of New Jersey State waters and about 17.3 miles of New York State waters. Two segments of the Raritan Bay Loop would be installed using the HDD method and the remainder of the facility, all within the offshore environment, would be constructed using the trenching methods described in section 2.3.3.4. Figure 2.1.1-1

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[15] Transco's alignment sheets can be found on FERC's eLibrary (https://www.ferc.gov/docs-filing/elibrary.asp) by conducting an "Advanced Search" for Accession No. 20180511-5170; under the Files, select the files titled "4_Vol_1_NESE_Environ_Rpts_Att_2_Part_1.PDF" and "5_Vol_1_NESE_Environ_Rpts_Att_2_Part_2.PDF."

[16] Transco's Mainline system extends more than 1,500 miles from the Gulf of Mexico to New England and is comprised of multiple pipelines within a generally contiguous right-of-way. In Lancaster County, Transco's Mainline system consists of three pipelines referred to as Mainline A, B, and C.

[17] Pipeline companies designate MPs along their pipeline systems as reference points to help describe the relative location of facilities or resources. The distance between two sequential MPs can but does not always equal 1 mile (i.e., 5,280 feet).

depicts government boundaries, waterbodies, existing infrastructure, and other features associated with the Raritan Bay Loop referenced throughout this EIS.

TABLE 2.1.1-1

Summary of Pipeline Facilities for the Northeast Supply Enhancement Project

State/Facility	Onshore or Offshore	County	Township/City	Length (miles)
PENNSYLVANIA				
Quarryville Loop				
42-inch-diameter pipeline	Onshore	Lancaster	Drumore	4.5
			East Drumore	4.5
			Eden	1.2
			Total	10.2
NEW JERSEY				
Madison Loop				
26-inch-diameter pipeline	Onshore	Middlesex	Old Bridge	1.8
			Sayreville	1.6
			Total	3.4
Raritan Bay Loop				
26-inch-diameter pipeline	Onshore	Middlesex	Sayreville	0.2
26-inch-diameter pipeline	Offshore	Middlesex	Sayreville	0.5
26-inch-diameter pipeline	Offshore	Middlesex	Old Bridge	1.3
26-inch-diameter pipeline	Offshore	Monmouth	Not Applicable	4.1
			Total	6.0 [a]
NEW YORK				
Raritan Bay Loop				
26-inch-diameter pipeline	Offshore	Queens	New York City	6.4
		Richmond	New York City	10.9
			Total	17.3

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

The proposed pipelines would be constructed of steel that is coated internally and externally to control corrosion, and would be installed underground for their entire length. The pipelines would be designed and constructed with a maximum allowable operating pressure (MAOP) of 1,440 pounds per square inch gauge (psig) in accordance with PHMSA regulations (49 CFR 192). As described in sections 2.3.1.9 and 2.3.3.8, Transco would validate the MAOP by hydrostatically testing the pipelines at 1.5 times the MAOP prior to placing the facilities in service. As an added safety factor, Transco would operate the pipelines at a pressure lower than the MAOP. More specifically, the maximum operating pressure of the Quarryville Loop would be 800 psig and the maximum operating pressure of the Madison Loop and Raritan Bay Loop would be 1,000 psig.

2.1.1.1 Ancillary Facilities

As summarized in table 2.1.1-2, the proposed pipeline loops would include ancillary facilities consisting of cathodic protection (CP) systems; new and modified mainline valves (MLVs) with tie-in assemblies; new and modified launcher/receiver facilities; and facilities to connect the Raritan Bay Loop to the existing Rockaway Delivery Lateral (RDL) at the Rockaway Transfer Point (MP 35.5).

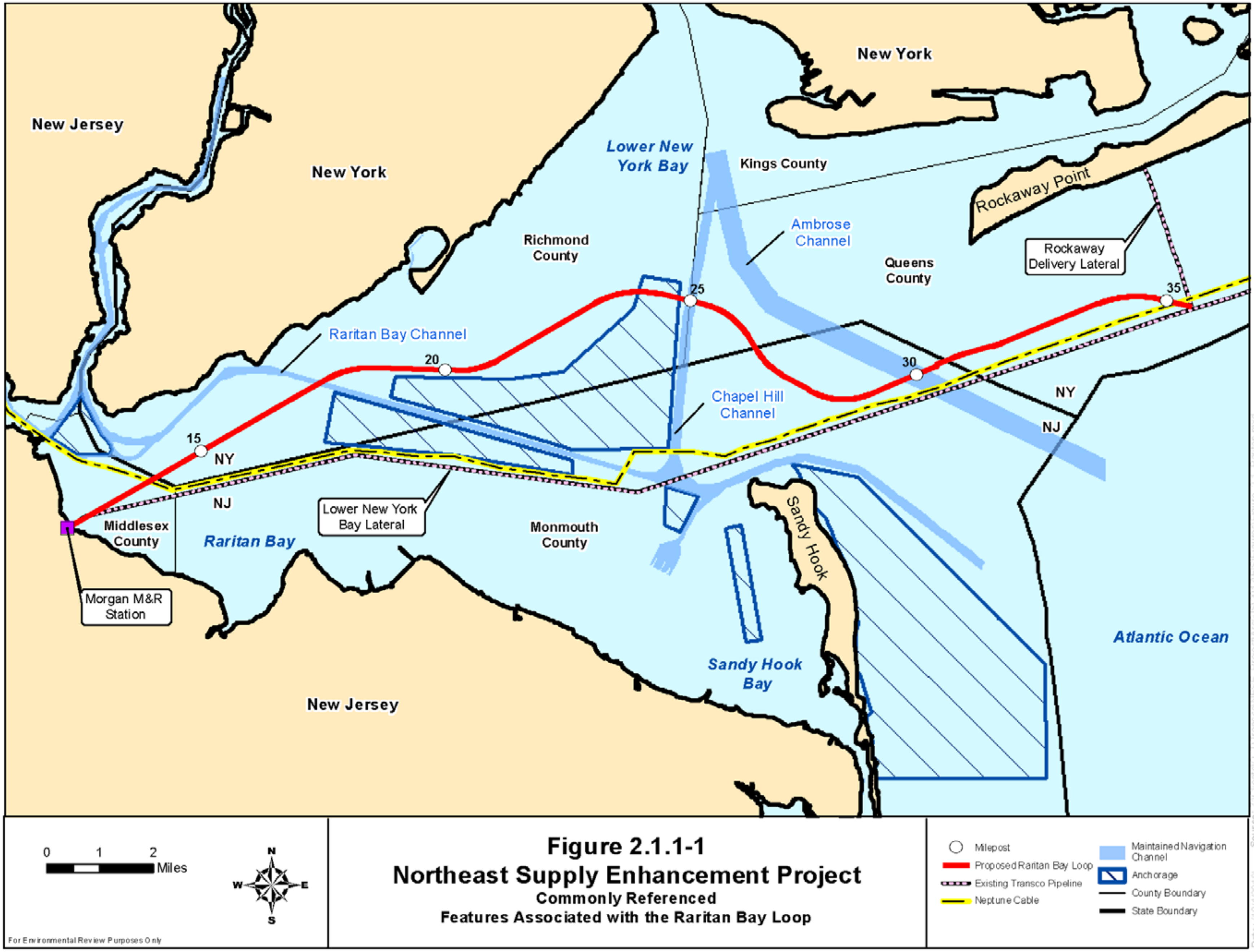

Figure 2.1.1-1
Northeast Supply Enhancement Project
Commonly Referenced Features Associated with the Raritan Bay Loop

TABLE 2.1.1-2

Ancillary Facilities for the Northeast Supply Enhancement Project

State/Facility	Milepost [a]	County	Scope of Work
PENNSYLVANIA			
Quarryville Loop			
MLV-195-5	1681.0	Lancaster	Install new mainline valve (MLV), launcher/receiver, and tie-in facilities at existing MLV site.
Cathodic Protection (CP) System	1684.2	Lancaster	Install 1,150-foot-long buried anode bed CP system perpendicular to pipeline loop.
MLV-195-8	1687.9	Lancaster	Install new MLV.
MLV-195-10	1691.2	Lancaster	Install new MLV, launcher/receiver, and tie-in facilities at existing MLV site.
NEW JERSEY			
Madison Loop			
MLV-200-55	8.6	Middlesex	Install new MLV, launcher/receiver, and tie-in facilities at existing MLV site.
MLV-200-59	11.9	Middlesex	Install new MLV, CP test station, and 80- to 100-foot-high communication pole.
Raritan Bay Loop			
Short CP Power Cable	12.0	Middlesex	Install 545-foot-long CP power cable by horizontal directional drill (HDD) onshore between MPs 12.0 and 12.1 (existing Morgan Meter & Regulator (M&R) Station).
Long CP Power Cable and Subsea Anode Sled	12.1	Middlesex	Install 1,830-foot-long CP power cable by HDD beginning at Morgan M&R Station and extending offshore to subsea anode sled; new rectifier unit on utility pole at Morgan M&R Station.
NEW YORK			
Raritan Bay Loop			
Rockaway Delivery Lateral Tie-in	35.5	Queens	Install subsea tie-in skid, tie-in valve spool, and four additional tie-in spools to connect the Raritan Bay Loop to the existing Rockaway Delivery Lateral manifold. [b]

[a] Mileposts are associated with locations along Transco's existing pipeline system.

[b] Transco would install a temporary launcher/receiver on the seafloor at MP 35.5 for cleaning the interior of the Raritan Bay Loop after construction and would remove the facility prior to placing the loop in service.

Transco proposes to install new, impressed current CP systems to control corrosion of the Quarryville Loop and the Raritan Bay Loop, and would utilize the existing CP system on the LNYBL Loop C for the Madison Loop. The CP system for the Quarryville Loop would consist of a 1,150-foot-long buried anode bed installed at the edge of an upland agricultural area perpendicular to the pipeline and parallel to a private road at MP 1684.2 (see page 2 in appendix B). The CP system would include a rectifier, which converts alternating current to direct current, installed underground within Transco's existing right-of-way. Electric power to the rectifier would be obtained via a drop-down from an existing overhead electric power line along the private road. The CP system for the Raritan Bay Loop would consist of anodes situated on a sled installed beneath the seafloor of Raritan Bay, approximately 1,000 feet offshore of Middlesex County, New Jersey and approximately 1,200 feet north from the Raritan Bay Loop. The anode sled would be approximately 10 feet by 10 feet, and connected to the Raritan Bay Loop by a 1,830-foot-long direct current power cable (the Long CP Power Cable) extending from the sled to Transco's existing onshore Morgan Meter and Regulating (M&R) Station at MP 12.1, and by a second direct current power cable (the Short CP Power Cable) extending 545 feet from the Morgan M&R Station to the start of the Raritan Bay Loop at MP 12.0 (see page 13A in appendix B). The Long and Short CP Power Cables would be installed using the HDD method and would include a small, pole-mounted rectifier at the existing Morgan M&R Station.

MLVs consist of a small system of aboveground and underground piping and valves that are used to control the flow of natural gas within the pipeline. MLVs can also be used to vacate, or blow-off, the gas within a pipeline segment, if necessary. MLVs can be located at interconnections within a transmission system (i.e., between a mainline pipeline and a loop) and at locations based on the PHMSA Class designation of the pipeline; in general, the distance between MLVs is reduced in areas of higher human population (see section 4.11.1).

Launcher/receiver facilities consist of an aboveground group of piping where internal pipeline cleaning and inspection tools, referred to as “pigs,” can be inserted into and retrieved from the pipeline.

Existing MLV sites at the start and end of the Quarryville Loop at MPs 1681.0 and 1691.2, respectively, would be modified to include a new MLV and new launcher/receiver with tie-in facilities, and a new MLV would be installed along the Quarryville Loop at about MP 1687.9. Along the Madison Loop, a new MLV, launcher/receiver, and tie-in facilities would be installed at an existing facility at MP 8.6, and a new MLV, CP test station, and communication pole would be installed at about MP 11.9. The new and modified MLVs, launcher/receivers, and tie-in facilities would generally be located within the boundary of existing Transco facilities or pipeline rights-of-way.

The Raritan Bay Loop would connect to the existing RDL at MP 35.5 in offshore New York waters. Due to the orientation of the existing LNYBL and RDL, the end of the Raritan Bay Loop would include a series of bends to align with the existing manifold on the RDL. These bends would be separated by short, straight segments of pipeline referred to as “spools.” The interconnection would also include new valves at the RDL manifold and on a separate tie-in skid. The ancillary facilities needed to connect the Raritan Bay Loop to the RDL would be installed beneath the seabed using the construction methods described in section 2.3.3.6.

2.1.2 Compressor Stations

Compressor stations utilize engines to maintain pressure within a pipeline system to deliver contracted volumes of natural gas to specific points at specific pressures. Compressor units can be powered by natural gas or electricity and are housed in buildings that are designed to attenuate noise. Most stations consist of a developed, fenced area within a larger parcel of land that remains undeveloped to provide a buffer from surrounding land uses.

As part of the NESE Project, Transco would: 1) modify existing Compressor Station 200 in East Whiteland Township, Chester County, Pennsylvania; and 2) construct and operate new Compressor Station 206 in Franklin Township, Somerset County, New Jersey. Construction procedures for the compressor stations are described in section 2.3.4.

2.1.2.1 Compressor Station 200 (Existing)

Transco proposes to add 21,902 horsepower (hp) of compression at existing Compressor Station 200. The modifications would include the following:

- one electric motor-driven (EMD) compressor;
- a building to house the additional compressor;
- a power control building;

- an air compressor/standby generator building;
- a variable frequency drive building;
- a variable frequency drive cooler;
- a standby electric generator unit (size to be determined);
- a medium voltage transformer;
- an isolation transformer; and
- a lube oil cooler unit.

The modifications would occur on land owned by Transco within the existing compressor station boundary (see page 8 in appendix B). Electric power for the compressor upgrade would be obtained from a new, non-jurisdictional electric transmission facility described in section 1.4.

2.1.2.2 Compressor Station 206 (New)

Transco proposes to construct and operate a new 32,000 hp compressor station that would include the following facilities:

- two Solar Mars® 100 (or equivalent) natural gas-fired, turbine-driven compressors;
- a building to house the compressors;
- a power control/air compressor building;
- an office/warehouse building;
- a drum-storage building;
- a telecommunications building;
- a 150-foot-tall communications tower;
- aboveground and buried suction/discharge piping;
- gas coolers;
- two 50-foot-tall gas turbine exhaust stacks;
- station scrubbers;
- blowdown silencers and deodorizers;
- a standby electric generator unit (1,175 hp);
- a medium voltage transformer;
- aboveground storage tanks for hydrocarbon liquids and oily water; and
- lube oil cooler units.

Compressor Station 206 would be located within a 52.3-acre undeveloped parcel comprised largely of wooded land (see page 9 in appendix B). The new compressor station would be served by non-jurisdictional water and electric power utilities described in section 1.4 and would include a new, permanent access road off of County Road 518. Transco would install a septic system to manage sanitary wastewater generated at the station. The station would be equipped with safety features such as pressure relief valves, emergency shutdown systems, gas/fire detection devices, and a security system consisting of video cameras, intrusion alarms, and coded and keyed access to the facility. Sections 4.11.1, 4.11.2, and 4.11.4 provide additional details regarding the safety design and operational features of the proposed station.

As indicated above, Compressor Station 206 would be connected to Transco's existing Mainline system by two parallel, 700-foot-long, 48-inch-diameter suction and discharge pipelines. The suction and discharge pipelines would occur within the Compressor Station 206 property or Transco's Mainline system right-of-way for about 75 percent of their length and would be installed within a reduced construction right-of-way. Therefore, impacts associated with the connecting pipelines are included in the impacts associated with the compressor station throughout this EIS.

We received many comments expressing concern about Transco's proposed location for Compressor Station 206 based primarily on proximity to residences, schools, and places of worship, and many commenters provided estimates of the distance between certain facilities and Compressor Station 206. Table 2.1.2-1 identifies the distance between the proposed compressor station building (the primary source of noise during operation of the facility) and facilities in the area. As indicated, the nearest residence is about 2,500 feet to the west; the nearest school is about 6,300 feet to the northeast; and the nearest place of worship is about 2,530 feet to the east.

TABLE 2.1.2-1

Distance of Compressor Station 206 to Area Residences, Schools, and Places of Worship

Facility [a]	Distance (feet) [b]	Direction
RESIDENCES [c]		
Residence	2,500	West
Residence	2,560	Northwest
Residence	2,650	East
Residence	2,950	North
Residence	3,200	Southeast
Residence	3,500	Northeast
Residence	3,800	East
Residence	4,150	South
Residence	7,400	Southwest
Princeton Manor Neighborhood	3,500	East
Carriage Trail Neighborhood	3,900	Northwest
Princeton Walk Neighborhood	5,000	Southeast
Kendall Park Neighborhood	5,200	Northeast
SCHOOLS		
Bright Horizons of Kendall Park	6,300	Northeast
Constable Elementary	7,000	Northeast
The Learning Center	7,600	South
Kids First Montessori	8,550	East
Noor-Ul-Imam/Islamic Society of Central New Jersey	9,100	Southeast
Kinder Care of South Brunswick	10,300	Southeast
Rocky Hill School	11,000	West
South Brunswick High School	12,500	Southeast
PLACES OF WORSHIP		
New Jersey Buddhist Vihara and Meditation Center (Buddha statue)	2,530	East
Mt. Zion African Methodist Episcopal	3,600	Southeast
Central New Jersey Hindu Association	7,200	Southwest
Kendall Park Baptist	8,900	Northeast
Trinity Episcopal	9,950	West
Kingston Presbyterian	10,350	Southwest
Kingston United Methodist	10,700	Southwest
Bharat Sevashram Sanga of North America	11,100	Northeast

[a] Residences, schools, and places of worship were identified by accessing on-line mapping tools and listings; aerial photographs; public comments; and information provided by Transco.
[b] Distance is approximate from the proposed compressor building to the referenced structure.
[c] The distance to neighborhoods is based on the nearest residence within the neighborhood to the compressor building.

Hydraulic modeling is used to determine the general location and size of compression facilities needed to efficiently meet the contracted natural gas deliveries. Based on hydraulic modeling, Transco concluded that Compressor Station 206 must be located near its existing Mainline system between MP

1780.0 near the Somerset County – Mercer County border and MP 1790.8 in North Brunswick Township, Middlesex County. We independently reviewed Transco's hydraulic modeling and, in section 3.4.1, consider alternative locations for Compressor Station 206, alternative configurations of Transco's system that could potentially eliminate the need for Compressor Station 206, and the use of EMD compression units at the facility rather than natural gas-fired turbines as proposed by Transco. Other concerns raised by commenters regarding Compressor Station 206 are addressed throughout this EIS (see table 1.3-1).

2.2 LAND REQUIREMENTS

The land requirements for the Project are summarized in table 2.2-1 and described below. A more detailed description of the land use requirements for the Project is presented in section 4.7.1. If the Project is approved, Transco's construction and operational work areas would be limited to those described in this EIS and any subsequent Commission authorizations.

Transco would utilize 14,523.7 acres during construction, of which 14,165.5 acres (98 percent) consists of open water in Raritan Bay and Lower New York Bay. Operation of the Project would require 145.2 acres. Of the area needed for operation, 31.3 acres of land and 85.6 acres of seafloor would be new permanent right-of-way for the pipelines and ancillary facilities; expansion of existing Compressor Station 200 would require 4.2 acres of land; operation of new Compressor Station 206 would affect 23.4 acres of land (which includes the permanent access road and suction/discharge piping); and 0.7 acre of land would be needed for other new permanent access roads. Transco would generally acquire easements and/or lease agreements for the property where the proposed pipelines, ancillary facilities, and permanent access roads would be located, and has acquired the parcel on which Compressor Station 206 would be located. The proposed modifications at existing Compressor Station 200 would occur within the fence line of the facility already owned by Transco.

2.2.1 Pipeline Right-of-Way

2.2.1.1 Quarryville and Madison Loops

In areas where the onshore pipeline loops would be installed using overland trenching methods, construction of the 42-inch-diameter Quarryville Loop would typically require a 100-foot-wide right-of-way and construction of the 26-inch-diameter Madison Loop would typically require a 90-foot-wide right-of-way. In wetlands, Transco would reduce the construction right-of-way to 75 feet with limited exceptions due to site specific conditions (see table 2.2.1-1).

TABLE 2.2-1

Summary of Land Requirements for the Northeast Supply Enhancement Project

State/Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
PENNSYLVANIA		
Quarryville Loop		
Pipeline Right-of-Way [a]	124.2	24.6
Additional temporary workspace (ATWS)	64.2	0.0
Access Roads	2.6	0.6
Contractor Yards	21.2	0.0
Compressor Station 200	28.9	4.2
Pennsylvania Subtotal	**241.1**	**29.4**
NEW JERSEY		
Madison Loop		
Pipeline Right-of-Way [a]	24.6	3.7
HDD Tracking Wires [b]	11.7	2.4
ATWS	14.0	0.0
Access Roads	10.2	0.1
Contractor Yards	15.3	0.0
Compressor Station 206 [c]	27.2	23.4
Raritan Bay Loop (Onshore)		
Pipeline Right-of-Way [d]	0.9	0.0
HDD Tracking Wires [e]	0.6	0.6
ATWS [f]	0.9	0.0
Access Road	0.4	0.0
Contractor Yards [g]	11.3	0.0
New Jersey (Onshore) Subtotal	**117.1**	**30.2**
Raritan Bay Loop (Offshore)		
Pipeline Right-of-Way [a, h]	3,376.7	22.4
ATWS	349.8	0.0
New Jersey (Offshore) Subtotal	**3,726.5**	**22.4**
New Jersey Subtotal	**3,843.6**	**52.6**
NEW YORK		
Raritan Bay Loop (Offshore)		
Pipeline Right-of-Way [a, h]	10,439.0	63.2
New York (Offshore) Subtotal	**10,439.0**	**63.2**
Project Total	**14,523.7**	**145.2**

[a] Includes ancillary facilities, which include CP systems, new and modified mainline valves, new and modified launcher/receiver facilities, and tie-in facilities.

[b] Transco would utilize 11.7 acres between the entry and exit points for the Cheesequake Road, Parkwood Village, and Lockwood Marina HDDs to lay guide wires on the ground surface. Construction activity in these areas would be limited to foot traffic only and hand-clearing of vegetation to provide line-of-sight. During operation, Transco would retain a total of 2.4 acres as permanent easement to include the HDD pipeline segments where the segments extend outside of Transco's existing easement for the Lower New York Bay Lateral Loop C but would not conduct vegetation maintenance over the HDD pipeline segments.

[c] Includes land requirements for the permanent access road and suction/discharge piping.

[d] Onshore temporary workspaces for the Morgan Shore Approach HDD and the Short and Long CP Power Cable HDDs.

[e] Transco would utilize 0.6 acre onshore to lay guide wires for the Morgan Shore Approach HDD and the Short and Long CP Power Cable HDDs. Construction activities in these areas would be limited to foot traffic only and hand-clearing of vegetation to provide line-of-sight. Transco would obtain permanent easements totaling 0.6 acre over the HDD segment of the Raritan Bay Loop and the Short and Long CP Power Cables but would not conduct any maintenance within these easements.

[f] Onshore ATWS for the Morgan Shore Approach HDD and the Short and Long CP Power Cable HDDs.

[g] The contractor yards that would be used during construction of the Raritan Bay Loop are existing shipping yards; therefore, use of these facilities would be consistent with their current use.

[h] Transco assumed a 5,000-foot-wide temporary right-of-way for constructing the Raritan Bay Loop from MPs 12.5 to 35.5, primarily to accommodate spread anchoring of construction vessels. As discussed in sections 4.3.3 and 4.5.2.8, only 87.8 acres of seafloor would be directly impacted during construction. Land requirements for operation of the offshore portion of the Raritan Bay Loop reflect the easement that would be acquired; however, no bottom-disturbing impacts associated with routine operations are anticipated.

TABLE 2.2.1-1					
Construction Rights-of-Way and Offsets of Quarryville and Madison Loops from Existing Transco Pipelines					
Facility	Construction Right-of-Way in Uplands (feet)	Construction Right-of-Way in Wetlands or Marine/Open Water (feet)	Typical Offset from Existing Transco Pipeline (feet)	Length of Co-location (miles/percent)	Width of Construction Right-of-Way Overlap (feet)
Quarryville Loop	100	75	25	9.9 / 97	0 to 100
Madison Loop	90	75	25	3.4 / 100	0 to 90

As indicated in table 2.2.1-1, the Quarryville and Madison Loops would be collocated with existing Transco facilities for 97 percent and 100 percent of their lengths, respectively, with a typical offset of 25 feet from existing pipelines. Because the onshore loops would be constructed adjacent to existing Transco pipelines, the workspace needed to construct the loops would overlap with Transco's current right-of-way, thereby reducing construction-related impacts. The construction right-of-way overlap for the Quarryville Loop would range from 0 to 100 feet, but would be at least 35 feet for 91 percent of the pipeline length. The construction right-of-way overlap for the Madison Loop would range from 0 to 90 feet, but would be at least 20 feet for 74 percent of the pipeline length. Drawings depicting typical pipeline construction cross sections are included in appendix C.

To enhance public safety during operation, Transco would expand the width of its existing, permanent right-of-way where necessary to include the Quarryville and Madison Loops. The width of the existing right-of-way varies, but expansion would not typically exceed 25 feet. Transco would not acquire new permanent right-of-way between approximate MPs 1682.5 and 1682.7, and MPs 1686.1 and 1686.8 of the Quarryville Loop, where the loop would be installed between existing pipelines to reduce impacts on residences on both sides of the right-of-way at these locations. Also, as described in section 2.3.2.1, Transco would use the HDD method to install three segments of the Madison Loop to minimize impacts on environmental resources and residences. The HDD segments would closely parallel Transco's existing LNYBL Loop C pipeline, but where the HDD segments deviate outside of the existing right-of-way, Transco would obtain new, permanent easements overlying the HDD pipeline segments, resulting in a contiguous easement for the LNYBL Loop C and the Madison Loop. However, Transco would not maintain these rights-of-way during the operating life of the facilities.

As discussed in section 2.1.1.1, ancillary facilities associated with the onshore loops including new and modified MLVs, launcher/receiver facilities, and tie-in facilities would be within Transco's operational right-of-way or in or adjacent to existing Transco aboveground facilities. Transco would use a 30-foot-wide right-of-way to install the CP system for the Quarryville Loop and would retain a 10-foot-wide right-of-way during operation of the system.

2.2.1.2 Raritan Bay Loop

Construction of the Raritan Bay Loop would require varying widths of rights-of-way depending on onshore or offshore location and construction methods. The Raritan Bay Loop would begin at the termination of the Madison Loop at MP 12.0. At this location, Transco has acquired a 0.9-acre vacant lot and would initiate the Morgan Shore Approach HDD to install the loop from MP 12.0, beneath the Raritan Bay shoreline at about MP 12.2, and exiting in Raritan Bay at about MP 12.5. For the onshore segment, Transco would utilize a temporary right-of-way to lay wires on the land surface to electronically guide the HDD.

Onshore construction land requirements would also include about 0.9 acre of land at Transco's existing Morgan M&R Station at MP 12.1, which would be used to initiate HDDs to install the Short CP Power Cable and the Long CP Power Cable. Transco would utilize a temporary right-of-way to lay guide wires on the land surface for these HDDs. Construction impacts associated with the guide wires for the onshore segments of the Morgan Shore Approach HDD and the Short and Long CP Power Cable HDDs would be limited to foot traffic and hand clearing of vegetation. Transco would obtain a total of 0.6 acre of permanent easement over the onshore segments of the Raritan Bay Loop and Short and Long CP Power Cables but would not maintain these rights-of-way during the operating life of the facilities.

The width of the construction right-of-way for the offshore segment of the Raritan Bay Loop would range from 125 feet at the shoreline to 2,500 feet at the exit point of the Morgan Shore Approach HDD at MP 12.5, and would then expand to 5,000 feet for the remainder of the loop, largely to provide for spread anchoring of construction vessels. This area encompasses 14,165.5 acres of surface water. However, Transco estimates that only 87.8 acres of seafloor would be directly affected by excavation and pipeline installation activities (trenching, other excavations, pipelay, and vessel mooring systems) and an additional 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediments disturbed by the offshore excavation and backfilling activities, based on Project-specific hydrodynamic sediment transport modeling (see sections 4.3.3 and 4.5.2.8). Table 2.2.1-2 summarizes construction rights-of-way and offsets of the Raritan Bay Loop from existing Transco pipeline facilities.

TABLE 2.2.1-2

Construction Rights-of-Way and Offset of the Raritan Bay Loop from Existing Transco Pipelines

Facility	Construction Right-of-Way in Uplands (feet)	Construction Right-of-Way in Wetlands or Marine/Open Water (feet)	Typical Offset from Existing Transco Pipeline (feet)
Raritan Bay Loop (Onshore) [a]	20	NA	50 – 85 [b]
Raritan Bay Loop (Offshore)	NA	125 - 5,000	85 – 20,000 [c]

[a] The onshore portion of the Raritan Bay Loop would be constructed using HDD in the Morgan Shore Approach HDD. Therefore, only a 20-foot-wide temporary workspace would be required along the path of the HDD for laying of HDD guide wires.

[b] The onshore portion of the Raritan Bay Loop would be offset by 50 feet horizontally from Transco's existing LNYBL Loop C and by 85 feet horizontally from Transco's existing LNYBL.

[c] The offshore portion of the Raritan Bay Loop would be offset by 85 feet horizontally from Transco's existing LNYBL between MP 12.2 and the exit point of the Morgan Shore Approach HDD near MP 12.5. The Raritan Bay Loop would then deviate from Transco's existing LNYBL by up to 3.8 miles between MPs 12.5 and 35.5.

NA = Not applicable.

Following construction, Transco proposes to retain a 30-foot-wide easement during operation of the Raritan Bay Loop in New Jersey and New York waters. Transco does not anticipate any routine activities that would disturb the seafloor during operation of the Raritan Bay Loop.

2.2.2 Compressor Stations

Modifications proposed for Compressor Station 200 would occur on land owned by Transco within the existing facility boundary. Construction at Compressor Station 200 would temporarily affect about 28.9 acres of land, of which approximately 4.2 acres would be permanently affected during operation of the new facilities.

Construction and operation of new Compressor Station 206 would occur at an undeveloped, 52.1-acre site comprised primarily of upland forest/woodland and wetlands. Construction of the new compressor station, including the suction and discharge piping needed to connect the facility to Transco's Mainline system, would temporarily affect about 19.9 acres of land, of which approximately 16.1 acres would be permanently affected during operation of the station (see section 2.2.5 for a description of land requirements for the permanent access road to Compressor Station 206).

2.2.3 Additional Temporary Workspace

Transco would require the use of additional temporary workspace (ATWS) along the pipeline rights-of-way for various road, wetland, and waterbody crossings; at the HDD entrance and exit locations; and for areas requiring specialized construction techniques (e.g., steep side slopes, topsoil storage areas). A list of ATWS associated with the Project is included in appendix D. The use of ATWS would temporarily affect about 428.9 acres, consisting of 79.1 acres (18 percent) of land in Pennsylvania and New Jersey, and 349.8 acres (82 percent) in New Jersey State waters (see table 2.2-1).

2.2.4 Contractor Yards

Transco would temporarily use seven contractor yards for field offices, equipment/pipe/material storage, pipe preparation/field assembly areas, parking, and equipment turn-around to support construction of the onshore portion of the Project, and two contractor yards to support construction of the offshore portion of the NESE Project (see table 2.2.4-1).

TABLE 2.2.4-1

Contractor Yards Associated with the Northeast Supply Enhancement Project

State/Facility	County/Township	Contractor Yard ID	Nearest Milepost	Area Affected (acres)
PENNSYLVANIA				
Quarryville Loop	Lancaster/Drumore	QUAR-CY-LA-1-002	1681.00	6.7
	Lancaster/East Drumore	QUAR-CY-LA-1-003	1685.65	1.8
	Lancaster/Eden	QUAR-CY-LA-1-001	1691.17	12.7
			Quarryville Loop Total	21.2
NEW JERSEY				
Madison Loop	Middlesex/Old Bridge	MADI-CY-MI-1-002	8.7	4.6
	Middlesex/Old Bridge	MADI-CY-MI-1-001	9.0	1.4
	Middlesex/Old Bridge	MADI-CY-MI-1-003	9.4	6.7
	Middlesex/Old Bridge	MADI-CY-MI-1-004	12.0	2.6
			Madison Loop Total	15.3
Raritan Bay Loop				
	Union/Elizabeth	ATWS-RBL-001	N/A	5.5
	Hudson/Bayonne	ATWS-RBL-009	N/A	5.8
			Raritan Bay Loop Total	11.3

The contractor yards associated with the Quarryville Loop generally consist of agricultural land and the contractor yards associated with the Madison Loop are generally wooded or open undeveloped parcels or previously used commercial/industrial land. Use of the contractor yards to support construction of the onshore loops would temporarily affect 36.5 acres of land. To support construction of the Raritan Bay Loop, Transco would lease 5.5 acres of space at the existing Construction and Marine Equipment (C&ME) yard located in Elizabeth, New Jersey (see page 27 in appendix B) and 5.8 acres of space at the existing Weeks Marine yard in Bayonne, New Jersey (see page 28 in appendix B). The C&ME and Weeks Marine sites would provide land-side access to the yards and function as the dock facilities for offshore construction, with direct barge access along the Arthur Kill, Kill Van Kull, and Upper New York Bay waterways.

2.2.5 Access Roads

Transco would utilize 26 roads during construction of the Project, including 17 existing roads, 8 new roads, and 1 existing road that would be extended (see section 4.7.1.5). Seven of the 26 roads would be used during operation of the Project, 4 of which would be new roads. New temporary and permanent access roads would be 20 to 40 feet wide. Construction of the access roads would affect 20.5 acres, and 8.5 acres would be permanently affected for access to the Project facilities. Of the area affected by construction and operation, about 7.3 acres would be associated with the 3,300-foot-long access road to Compressor Station 206, which would include areas maintained for storm water management and utilities to the facility.

2.3 CONSTRUCTION PROCEDURES

The Project would be designed, constructed, tested, operated, and maintained in accordance with the DOT's regulations in 49 CFR 92, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, and other applicable federal and state regulations. The DOT regulations specify pipeline material selection; protection from internal, external, and atmospheric corrosion; qualifications of welders and operations personnel; and other design, materials, construction, and reporting requirements. Transco would also comply with FERC requirements under 18 CFR 380.15, Siting and Maintenance Requirements. These safety regulations are intended to ensure adequate protection of the public, pipeline workers, contractors, and employees, and to prevent natural gas pipeline incidents and accidents.

To reduce impacts during construction and operation of the Project, Transco would implement its *Project-Specific Erosion Control, Revegetation, and Maintenance Plan* (Transco Plan) and *Project-Specific Wetland and Waterbody Construction and Mitigation Procedures* (Transco Procedures) (see appendices E and F, respectively). These are based on the mitigation measures described in the FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures),[18] but include several proposed site-specific modifications to the FERC Procedures (see tables 2.3-1 and 2.3-2).

Transco's Plan and Procedures are referenced throughout this EIS, but generally include measures that:

- minimize workspace and the duration of construction in uplands and wetlands;
- minimize the impact of construction on soil and vegetation;
- minimize erosion in uplands and sedimentation in wetlands and waterbodies;
- minimize impacts on terrestrial and aquatic species;
- maintain and control the flow of water in waterbodies;
- enhance restoration of affected areas; and
- minimize impacts on residential areas.

We have reviewed Transco's Plan and Procedures, found them to be acceptable, and have determined that adherence to the requirements of these plans would reduce the impacts of the Project.

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[18] The FERC Plan and Procedures are a set of construction and mitigation measures developed to minimize the potential environmental impacts of pipeline construction in general. The FERC Plan can be viewed on the FERC Internet website at http://www.ferc.gov/industries/gas/enviro/plan.pdf. The FERC Procedures can be viewed on the FERC Internet website at http://www.ferc.gov/industries/gas/enviro/procedures.pdf.

TABLE 2.3-1

Proposed Modifications to the FERC Procedures

Section	Proposed Modification	Discussion	FERC Conclusion
V.B.2.a and VI.B.1.a	Transco proposes to modify the requirement that ATWS be located at least 50 feet from a waterbody or wetland. Transco would locate ATWS within 50 feet of specific waterbodies and wetlands where necessary due to site-specific conditions.	At FERC staff's request, Transco removed or modified ATWS at four locations to avoid or reduce impacts on wetlands and waterbodies. Table 2.3-2 identifies the 16 remaining locations where Transco proposes ATWS within 50 feet of a waterbody and/or wetland, and provides site-specific justification for each location. These ATWS are associated with special construction methods such as HDD or road crossings and are generally required to provide a safe work area. Transco would implement other construction and restoration methods in the FERC Procedures to minimize impacts on these wetlands and waterbodies.	Sufficient Justification
II.A.2 and VI.A.3	Transco proposes to modify the requirement to limit the width of the construction right-of-way in wetlands to 75 feet. Transco would utilize a construction right-of-way greater than 75 feet wide at one location due to site-specific conditions.	Transco would require a construction right-of-way greater than 75 feet in one wetland (W-T07-004) at the Lockwood Marina HDD entry site at MP 11.5 of the Madison Loop. At FERC staff's request, Transco modified the workspace associated with this HDD to reduce wetland impacts. Alternative locations for the HDD entry would increase impacts on residences, impact other wetlands and waterbodies, or increase the length of the HDD, adding risk to the installation. Transco would implement other construction and restoration methods in the FERC Procedures to minimize impacts on this wetland.	Sufficient Justification

TABLE 2.3-2

Additional Temporary Workspace within 50 feet of a Wetland or Waterbody

Location/Facility/ ATWS ID	Approx. Milepost	Purpose	Wetland/Waterbody Identification Number [a]	Distance from Wetland/ Waterbody (feet)	Justification
Lancaster County, Pennsylvania					
Quarryville Loop					
LA-063-3	1686.1	Staging Area	W-T02-014A-1, W-T02-014B-1	18	Allow room to support special residential construction methods including fabrication of drag sections to reduce impacts on adjacent Tanglewood neighborhood. The staging area and wetlands are within an existing pasture/ hay field.
LA-063-4	1686.5	Road and Stream Crossing	W-T02-002B-1	37	Allow room to safely construct between a road crossing and a stream crossing. The ATWS is between the road and stream.
LA-063-5	1686.5	Stream Crossing	W-T02-004A-1	9	Allow room to safely construct at a stream crossing. The position of the stream where it crosses the right-of-way prohibits moving the ATWS to the other side of the right-of-way.
Middlesex County, New Jersey					
Madison Loop					
MID-006_1	8.9	HDD	W-T01-009A-1	5	Adequate workspace needed to safely operate equipment due to proximity of the wetland to a P.I. near the Cheesequake Road HDD exit.
MID-006_2	8.8	HDD	WW-T01-002, W-T15-001A-1	0	Adequate workspace needed for spoil storage and operation of equipment at the Cheesequake Road HDD. The workspace was reduced to minimize wetland impacts. Further reduction of the workspace to maintain a 50-foot setback from stream WW-T01-002 and wetland W-T15-001A-1 would necessitate additional stringing sections and tie-in welds during pullback.
MID-013	9.2	HDD	WW-T15-004B, WW-T15-005, W-T15-003C-1, W-T15-003A-2, W-T15-003A-3	0	Adequate workspace needed for spoil storage and operation of equipment at the Parkwood Village HDD. The workspace was reduced to minimize impacts on a tract of forested land. Further reduction of the workspace to maintain a 50-foot setback from streams WW-T15-004B and WW-T15-005, and wetlands W-T15-003C-1, W-T15-003A-2, and W-T15-003A-1 would necessitate additional stringing sections and tie-in welds during pullback.
MID-013_1	9.3	HDD	W-T15-002A-1, W-T15-003A-3	0 22	Adequate workspace needed for safe operation of equipment at the Cheesequake Road and Parkwood Village HDDs. The workspace was reduced to avoid wetland W-T15-002A-1; however, a 50-foot setback of from the wetland would not provide sufficient workspace for safe operation of construction equipment during HDD operations.
MID-013_4	9.4	P.I.	W-T15-002A-1	0	Adequate workspace needed to safely operate equipment due to proximity of wetland to a P.I. The workspace was reduced to avoid wetland W-T15-002A-1; however, a 50-foot setback from the wetland would not provide sufficient workspace for safe operation of construction equipment during installation of the P.I.

TABLE 2.3-2 (cont'd)

Additional Temporary Workspace within 50 feet of a Wetland or Waterbody

Location/Facility/ ATWS ID	Approx. Milepost	Purpose	Wetland/Waterbody Identification Number [a]	Distance from Wetland/ Waterbody (feet)	Justification
MID-043	10.8	Side Slope	W-T07-001C-1	14	Adequate workspace needed for spoil storage and safe operation of equipment in area of side slope construction. A 50-foot offset between the workspace and wetland would reduce a portion of workspace that is in an area with significant side slope, and is, therefore, not possible due to workspace constraints.
MID-048	11.3	Staging Area	W-T07-003A-1, W-T07-003B-1	0	Adequate workspace needed for staging of construction equipment and truck turn around. A 50-foot offset from the wetland would not be feasible due to workspace constraints.
MID-050_1	11.4	Road Crossing	W-T07-003A-1, W-T07-003B-1	0	Adequate workspace needed for safe equipment access at the road crossing. A 50-foot offset from the wetland would not be feasible due to workspace constraints and the curve of a road crossing.
MID-051	11.5	HDD	W-T07-004D-1	0	Adequate workspace needed for spoil storage and to safely operate equipment during the Lockwood Marina HDD. A 50-foot offset between the workspace and wetland is not feasible due to workspace constraints and the presence of a stream on the other side of the right-of-way.
MID-052	11.5	HDD	WW-T07-001, W-T07-004D-1	32 0	Adequate workspace needed for spoil storage and to safely operate equipment during the Lockwood Marina HDD. The workspace was offset as far from the stream as possible considering workspace constraints in this location. Further reduction of the workspace to provide a 50-foot setback from the stream and wetland would not allow sufficient room for safe operation of construction equipment.
MID-054	11.8	HDD	W-T01-017D-1	0	Adequate workspace needed for spoil storage and to safely operate equipment during HDD activities. In this location, the proposed pipeline loop is within Transco's existing right-of-way and approximately 55 feet from the wetland. A 50-foot offset between the workspace and wetland would not allow sufficient workspace for safe operation of construction equipment.
MID-054_1	11.8	Hydrotest Water Withdrawal and Discharge	W-T01-017A-1, W-T01-017D-1. WB-T01-001	0	Adequate workspace needed for spoil storage and to safely operate equipment to a water source for hydrostatic testing of the proposed Madison Loop. A 50-foot offset between the workspace and wetlands is not feasible due to workspace constraints.
MID-055	11.9	HDD	W-T01-017D-1	0	Adequate workspace needed for spoil storage and to safely operate equipment during installation of a MLV and the Lockwood Marina HDD. A 50-foot offset from the wetland is not feasible due to workspace congestion associated with construction of the MLV on the opposite side of the right-of-way.

[a] Wetland identification numbers begin with "W." Waterbody identification numbers begin with "WW" or "WB."

Notes:

HDD = Horizontal directional drill.

P.I. = Pipe inflection.

Based on Project-specific conditions, Transco prepared other plans to enhance safety and further avoid or reduce environmental impacts associated with the Project (see table 2.3-3). These plans are described in more detail throughout this EIS.

TABLE 2.3-3

Construction and Restoration Plans for the Northeast Supply Enhancement Project

Plan Name	Location
Agricultural Construction and Monitoring Plan	Attachment 7 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Blasting Plan	To be filed with the FERC prior to initiating any blasting activity, if blasting would be required.
Cable Crossing Plan	Attachment 14 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665 The final plan will be submitted prior to construction of the offshore portion of the Raritan Bay Loop.
Horizontal Directional Drill Plans (Madison Loop HDDs)	Attachment 5 to Volume 1 of Supplemental Filing (May 11, 2018). FERC Accession No. 20180511-5170. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14915402
Horizontal Directional Drill Plans (Morgan Shore Approach HDD and Ambrose Channel HDD)	Attachment 18 to Volume 2 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531694
Horizontal Directional Drill Plans (Long and Short CP Power Cable HDD)	Attachment 16 to Volume 2 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531694
Horizontal Directional Drill Contingency Plan (Onshore)	Attachment 3 to Environmental Information Request response (August 8, 2017). FERC Accession No. 20170810-5125. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14657648 The final plan including agency contact information in the event of an inadvertent drilling fluid release will be provided with the Implementation Plan if the Project is approved.
Horizontal Directional Drill Contingency Plan (Offshore)	Attachment 4B in Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665 The final plan including agency contact information in the event of an inadvertent drilling fluid release will be provided in the Implementation Plan if the Project is approved.
Emergency Preparedness and Response Plan	Attachment 17 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665 The final plan, addressing agency comment, will be provided with the Implementation Plan prior to construction if the Project is approved.
Fugitive Dust Control Plan	Attachment 3 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Marine Mammal Observer Training and Response Protocol Plan	Attachment 9 to Volume 1 of Supplemental Filing (September 7, 2017). FERC Accession No. 20170907-5176. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14676007
Materials Management Plans	Attachment 10 to Volume 1 of Supplemental Filing (May 11, 2018) FERC Accession No. 20180511-5170. PDF files 27 through 39: https://elibrary.ferc.gov/idmws/search/intermediate.asp?link_file=yes&doclist=14668807
Final Migratory Bird Plan	Supplemental Filing (November 6, 2018). FERC Accession No. 20181106-5038. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15091057
Noxious Weed and Invasive Plant Management Plan	Attachment 5 to Volume 1 of Supplemental Filing (September 7, 2017). FERC Accession No. 20170907-5176. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14676002

TABLE 2.3-3 (cont'd) **Construction and Restoration Plans for the Northeast Supply Enhancement Project**	
Plan Name	Location
Offshore Safety Measures	Attachment 13 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Project-Specific Erosion Control, Revegetation, and Maintenance Plan	**Appendix E (EIS)** Attachment 1 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102.
Project-Specific Wetland and Waterbody Construction and Mitigation Procedures	**Appendix F (EIS)** Attachment 2 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102.
Residential Construction Plans	**Appendix G (EIS)** Attachment 3 to Volume 1 of Supplemental Filing (May 11, 2018). FERC Accession No. 20180511-5170.
Source Water Protection Area Notification Plans	Attachment A2-3 of Environmental Information Request response (June 1, 2017). FERC Accession No. 20170601-5277. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14605276
Spill Plan for Oil and Hazardous Materials	Attachment 9 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665 The final plan including agency contact information in the event of a spill, will be provided in the Implementation Plan if the Project is approved.
Traffic and Transportation Management Plan	To be submitted with the Implementation Plan prior to construction, if the Project is approved.
Unanticipated Discovery of Contamination Plan	Attachment 4 of Supplemental Filing (June 6, 2017). FERC Accession No. 20170606-5115. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14608803 The final plan including emergency contact information will be provided in the Implementation Plan if the Project is approved.
Unanticipated Discovery Plan for Offshore Cultural Resources	Attachment 6 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Unanticipated Discovery Plan for Onshore Cultural Resources	Attachment 5 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Unanticipated Discovery Plan for Paleontological Resources	Attachment 12 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665
Winter Construction Plan	Attachment 11 to Appendix 1B in Resource Report 1 (March 27, 2017). FERC Accession No. 20170327-5102. PDF file: https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14531665

The Project would involve construction in the onshore environment of Pennsylvania and New Jersey, and in the marine, offshore environment of New Jersey and New York. Because of the different environments in which the Project would occur, onshore construction methods are described in sections 2.3.1 and 2.3.2, and offshore construction methods are described in section 2.3.3. Construction procedures associated with the compressor stations are described in section 2.3.4.

2.3.1 General Onshore Pipeline Construction Procedures

The entire length of the Quarryville Loop (10.2 miles) and 2.3 miles (68 percent) of the Madison Loop would be completed using sequential, overland pipeline construction techniques. The remaining 1.1 miles (32 percent) of the Madison Loop would be constructed in three segments using the HDD method described in section 2.3.2-1, and the onshore portion of the Raritan Bay Loop (0.2 mile long) would also be installed using the HDD method.

The overland pipeline construction techniques include surveying and staking; placement of erosion and sediment controls; clearing and grading; trenching; pipe stringing, bending, and welding; coating of field welds; lowering-in and backfilling; cleanup and restoration; hydrostatic testing; and commissioning (figure 2.3.1-1). These techniques would generally proceed in an assembly line fashion with construction crews moving down the right-of-way as work progresses. Construction at any single point along the pipelines, from surveying and staking to cleanup and restoration, would typically last from about 8 to 16 weeks.

2.3.1.1 Survey and Staking

After Transco completes land or easement acquisition and before the start of construction, civil survey crews would stake the limits of the construction right-of-way, the centerline of the proposed trench, ATWS, foreign pipeline and utility crossings, and other approved work areas. Property owners would be notified prior to surveying and staking activities. Transco would mark approved access roads using temporary signs or flagging and the limits of approved disturbance on any access roads requiring widening. Transco would also mark other environmentally sensitive areas (e.g., waterbodies, cultural resources, and sensitive species) where appropriate. Property markers and old survey monuments would be referenced and marked, and replaced during restoration.

2.3.1.2 Erosion and Sediment Control

Temporary erosion controls would be installed along the construction right-of-way immediately after initial disturbance of the soil in accordance with Transco’s Plan and Procedures and would be maintained throughout construction. Temporary erosion control measures would remain in place until permanent erosion controls are installed or restoration is completed. Transco would employ Environmental Inspectors (EI) during construction to help determine the need for erosion controls and ensure that they are properly installed and maintained. Additional discussion of EI responsibilities is provided in section 2.5.2.

2.3.1.3 Clearing and Grading

Prior to beginning ground-disturbing activities, Transco’s construction contractors would contact the One-Call system for each state to locate, identify, and flag existing underground utilities to prevent accidental damage during pipeline construction. Once this process is complete, the clearing crew would mobilize to the construction areas. Fences along the rights-of-way would be cut and braced, and temporary gates and fences would be installed to contain livestock, if present. Clearing and grading would remove trees, shrubs, brush, roots, and large rocks from the construction work area and would level the right-of-way surface to allow safe operation of construction equipment. Vegetation would generally be cut or scraped flush with the surface of the ground, leaving rootstock in place where possible. Trees, if suitable, may be taken offsite by the contractor and used for timber or may be chipped on-site and removed. Chipped material not removed may be spread across upland areas of the right-of-way in a manner that does not inhibit revegetation. Wood chips would not be left in agricultural lands or wetlands or stockpiled in a manner that could result in transport into a wetland or waterbody. If individual landowners request that trees cleared from the right-of-way be retained, Transco would place the timber in upland areas at the edge of the right-of-way as identified by the EI and directly accessible to the landowner.

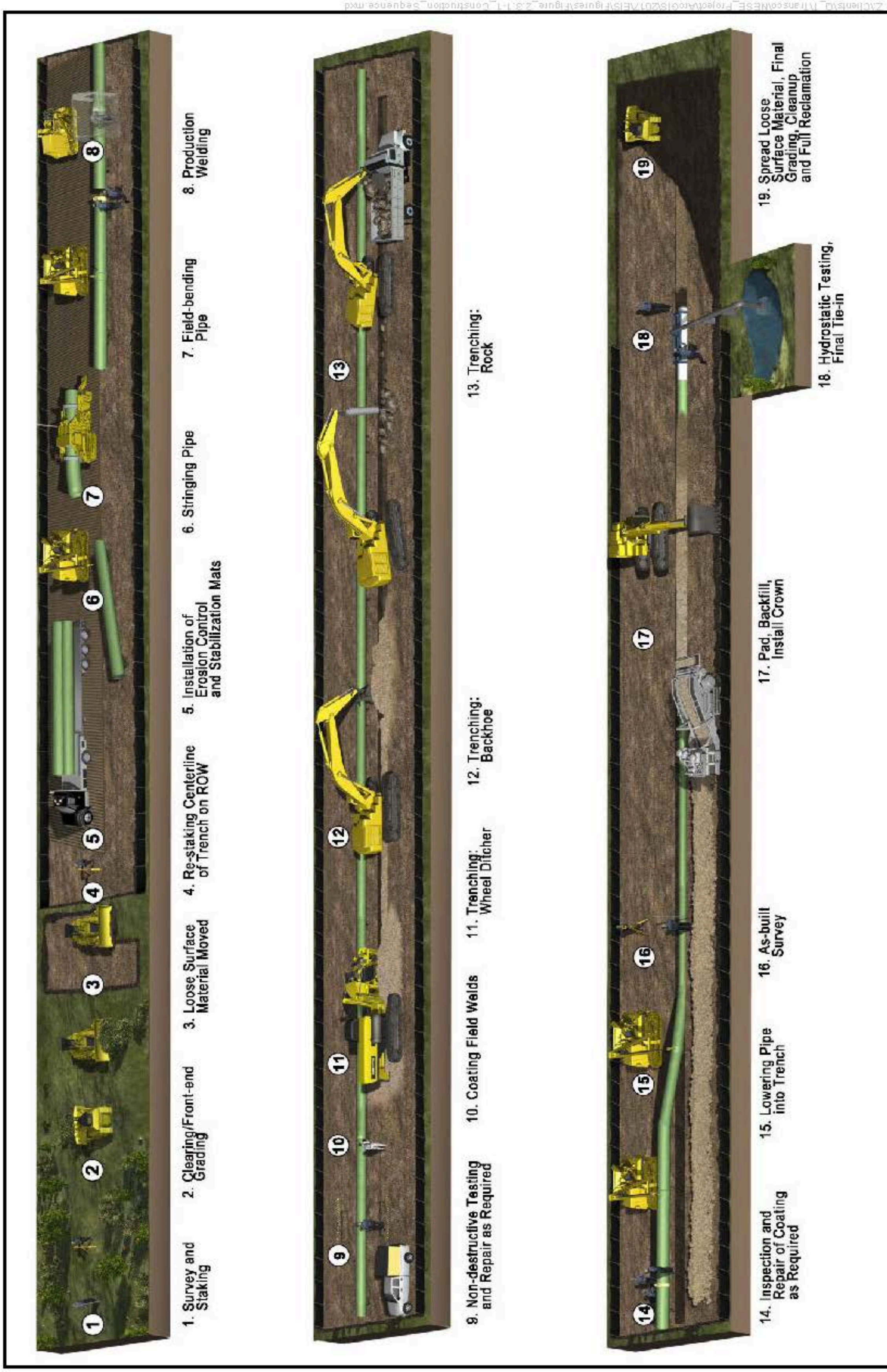

Figure 2.3.1-1
Northeast Supply Enhancement Project
Typical Onshore Pipeline Construction Sequence

For Environmental Review Purposes Only

Grading would be conducted where necessary to provide a reasonably level work surface. More extensive grading would be required in uneven terrain and where the right-of-way crosses steep slopes and side slopes. Topsoil from subsoil would be graded and separated as outlined in Transco's Plan and Procedures. Typically, topsoil would be segregated from subsoil in non-saturated wetlands, cultivated or rotated croplands, managed pastures, hayfields, residential areas, and in other areas requested by the landowner or land managing agency unless Transco is instructed by a landowner or land managing agency not to do so or Transco imports topsoil in accordance with its Plan. In soils with less than 12 inches of topsoil, the entire topsoil layer would be segregated. During backfilling, subsoil would be returned to the trench first. Topsoil would follow such that spoil would be returned to its original horizon.

2.3.1.4 Trenching

Soil and bedrock would be removed to create a trench into which the pipeline would be placed. A rotary trenching machine, track-mounted excavator, or similar equipment would be used to dig the pipeline trench. Transco does not anticipate the need to conduct blasting, but if bedrock would be encountered that could not be removed by mechanical means, Transco would develop and implement a Project-specific Blasting Plan.

The trench would be excavated to a depth that would provide sufficient cover over the pipeline in accordance with DOT standards in 49 CFR 192.327 (see section 4.11.1 for detailed depth of cover requirements). Typically, the trench would be deep enough to provide a minimum of 3 feet of cover in uplands, 4 feet in onshore waterbody crossings, and 5 feet below public roads and railroads. Additional cover (above DOT standards) could also be negotiated at a landowner's request to accommodate specific land use practices. Additional depth of cover generally requires a wider construction right-of-way (resulting in greater temporary disturbance) to store the additional trench spoil. Spoil material excavated from the trench would be temporarily piled to one side of the right-of-way, adjacent to the trench. Subsoil would not be allowed to mix with the previously stockpiled topsoil.

2.3.1.5 Pipe Stringing, Bending, Assembly, and Welding

Transco would obtain the 42-inch-diameter steel pipeline and the 26-inch-diameter steel pipeline needed for the Quarryville and Madison Loops in 40- or 60-foot lengths referred to as "joints." The pipe would be internally coated at the factory with liquid epoxy and externally coated with fusion-bonded epoxy or a combination of fusion-bonded epoxy and abrasion-resistant overlay coatings to inhibit corrosion by preventing moisture from coming in direct contact with the steel. The pipe joints would be delivered to Transco's contractor yards for storage and then distributed to the right-of-way by tractor-trailer, where it would be off-loaded and placed next to the trench using a sideboom tractor. Typically, several pipe joints are lined up end-to-end or "strung" to allow for welding into continuous lengths known as strings. Individual joints would be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends.

Most of the pipe would be delivered to the contractor yards and work areas in straight sections. Some bending of the pipe would be required in the field to enable the pipeline to follow the natural grade of the trench and direction changes of the right-of-way. Selected joints would be bent by track-mounted hydraulic bending machines as necessary prior to line-up and welding. Manufactured bends and pre-fabricated elbow fittings may be used in certain circumstances as needed. Following stringing and bending, the individual joints of pipe would be aligned and welded together. All welding would be performed according to applicable American National Standards Institute, American Society of Mechanical Engineers, and American Petroleum Institute standards, as well as Transco specifications. Only welders qualified to meet the standards of these organizations would be used during construction. Every completed weld would be examined by a welding inspector to determine its quality using radiographic or other approved methods as outlined in 49 CFR 192. Radiographic examination is a nondestructive method of inspecting the inner structure of welds and determining the presence of defects. Welds that do not meet the regulatory standards and Transco's established specifications would be repaired or removed.

2.3.1.6 Coating Field Welds, Inspection, and Repair

Once the welds are made, a coating crew would coat the area around the weld with additional epoxy or other coating before the pipeline is lowered into the trench. Prior to application, the coating crew would thoroughly clean the bare pipe with a power wire brush or sandblast machine to remove dirt, mill scale, and other debris. The crew would then apply the coating and allow it to dry.

The pipeline would be inspected electronically (also referred to as "jeeped" because of the sound of the alarm on the testing equipment) for faults or voids in the coating and would be visually inspected for scratches and other defects. Transco would repair any damage to the coating before the pipeline is lowered into the trench.

Special tie-in crews would be used at some locations, such as at waterbody and road crossings, at changes in topography, and at other selected locations as needed. A tie-in is typically a relatively small segment of pipeline specifically used to cross certain features as needed. Once the pipeline segment is installed across the feature, the segment is then welded to the rest of the pipeline.

2.3.1.7 Lowering-in and Backfilling

Before the pipeline is lowered-in, the trench would be inspected to ensure that it is free of rocks and other debris that could damage the pipe or protective coating. Typically, any water that is present in the trench would be removed and pumped to a vegetated upland through an approved filter. The pipeline would then be lowered into the trench by a series of side-boom tractors (tracked vehicles with hoists on one side and counterweights on the other), which would carefully lift the pipeline and place it on the bottom of the trench. After the pipe is lowered into the trench, final tie-in welds would be made and inspected.

After the pipe is positioned in the trench, crews would backfill the trench with the previously excavated material. Depending on soil conditions, Transco would use a padding machine or similar equipment to ensure that about 6 inches of subsoil free from rocks would surround the pipe along the bottom, both sides, and at the top. Topsoil would not be used as padding material. Where sufficient padding material is not available on site, or when the native material that was excavated from the trench is rocky or otherwise not suitable for backfill material, the acquisition of backfill from other sources may be necessary.

Trench breakers (stacked sand bags or polyurethane foam) would then be installed in the trench on slopes at specified intervals to prevent subsurface water movement along the pipeline. The trench would then be backfilled using the excavated material. All suitable material excavated during trenching would be redeposited into the trench using conventional backfill methods. Transco may place a crown of soil over the trench to compensate for settling. Previously segregated topsoil would then be spread across the graded construction right-of-way where applicable.

2.3.1.8 Cleanup and Restoration

Within 20 days of backfilling the trench (10 days in residential areas), all work areas would be graded and restored to preconstruction contours and natural drainage patterns as closely as possible. Permanent slope breakers or diversion berms would be constructed and maintained in accordance with Transco's construction and restoration plans. Fences, sidewalks, driveways, stone walls, and other structures would be restored or repaired as necessary. If seasonal or other weather conditions prevent compliance with these timeframes, temporary erosion controls would be maintained until conditions allow completion of final cleanup.

Topsoil and subsoil would be tested for compaction at regular intervals in agricultural areas disturbed by construction activities, and severely compacted agricultural areas would be plowed with a paraplow or other deep tillage equipment. Cut and scraped vegetation in the storage area would be spread back across the right-of-way. Surplus construction material and debris would be removed from the right-of-way unless the landowner or land-managing agency approves otherwise. Excess rock/stone would be removed from at least the top 12 inches of soils in agricultural and residential areas and, at the landowner's request, in other areas. Transco would remove excess rock/stone such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent non-right-of-way areas. Landowners are also at liberty to negotiate certain specific construction requirements and restoration measures directly with Transco.

Finally, crews would install permanent erosion controls within the right-of-way, if necessary, and initiate revegetation measures in accordance with Transco's Plan and Procedures and other permit requirements. Restoration activities would be completed in accordance with landowner agreements, permit requirements, and written recommendations on seeding mixes, rates, and dates obtained from the local conservation authority or other duly authorized agency and in accordance with Transco's construction and restoration plans. The right-of-way would be seeded within 6 working days following final grading, weather and soil conditions permitting. Alternative seed mixes specifically requested by the landowner or required by agencies may be used. Any soil disturbance that occurs outside the permanent seeding season or any bare soil left unstabilized by vegetation would be mulched to minimize erosion, in accordance with Transco's construction and restoration plans. Additional discussions of restoration activities are provided in sections 4.2, 4.4, and 4.7.

Markers showing the location of the pipeline would be installed along the pipeline rights-of-way according to Transco specifications as well as at fence, road, and railroad crossings to identify the owner of the pipeline and convey emergency information in accordance with applicable governmental regulations, including DOT safety requirements. Special markers providing information and guidance for aerial patrol pilots would also be installed.

After construction, Transco, as well as FERC staff, would conduct follow-up inspections to monitor the restoration and revegetation of all areas disturbed during construction.

2.3.1.9 Hydrostatic Testing

After burial, the Quarryville and Madison Loops would be hydrostatically tested in accordance with 49 CFR 192 and Transco requirements to confirm that they could withstand the operating pressure for which they were designed. Hydrostatic testing involves filling the pipeline with water and pressurizing the water for several hours; Transco would conduct the hydrostatic testing at a pressure of 1.5 times the MAOP of the loops.

Hydrostatic testing of the Quarryville Loop would occur in two segments and Transco plans to reuse the water from one segment to also test the second segment. Hydrostatic testing of the Madison Loop would occur in one segment and Transco is evaluating the feasibility of reusing the hydrostatic test water between the Madison Loop and the Raritan Bay Loop. Any leaks detected by hydrostatic testing would be repaired and the section of pipe retested until the required specifications were met.

Water for hydrostatic testing of the Quarryville Loop would be obtained from a municipal source and water for testing the Madison Loop would be obtained from a surface waterbody near the loop. The interior of the pipeline loops would be new and free of chemicals and lubricants and Transco does not propose to use any chemical additives for drying or other purposes of the onshore loops (Transco would use a dye to help detect leaks during hydrostatic testing of the Raritan Bay Loop (see section 2.3.3.8)). After successful completion of the hydrostatic tests, the test water for the Quarryville Loop would be discharged to dewatering structures in vegetated upland areas at two locations, whereas the test water of the Madison Loop would be returned to the withdrawal location. All hydrostatic test water withdrawals and discharges would be conducted according to permit requirements and in a manner that would minimize impacts on aquatic resources and the potential for erosion and sedimentation to occur. Section 4.3.2.7 provides additional information on hydrostatic testing.

2.3.1.10 Commissioning

Commissioning involves verifying that equipment has been properly installed and is working, verifying that controls and communications systems are functioning, and confirming that the pipeline is ready for service. In the final step, the onshore pipeline loops would be prepared for service by purging the pipelines of air and loading it with natural gas. Transco would not be authorized to place the pipeline facilities into service until written permission is received from the Director of the FERC's Office of Energy Projects (OEP). This approval would not be issued until FERC staff determines that restoration of all construction workspaces is proceeding satisfactorily.

2.3.2 Special Onshore Pipeline Construction Procedures

In addition to the general upland pipeline construction methods described above, Transco would implement special construction procedures due to site-specific conditions and to reduce overall Project impacts.

2.3.2.1 Waterbody Crossings

The Quarryville Loop would cross 10 waterbodies in Pennsylvania and the Madison Loop would cross 8 waterbodies in New Jersey (see section 4.3.2) for details regarding waterbodies affected by the Project). The access road to Compressor Station 206 would also cross one intermittent waterbody and one ephemeral waterbody. The waterbody crossings would be constructed in accordance with the methods and timing restrictions described in Transco's Procedures (with the modifications listed in tables 2.3-1 and 2.3-2), and state and federal permit requirements. Transco would use one of the following methods to cross each waterbody, and drawings depicting the typical crossing methods are included in appendix C.

Conventional Open-Cut Method

The general upland construction techniques described in section 2.3.1 would be used at waterbodies that are dry (i.e., without perceptible flow) at the time of construction, provided that the EI verifies that water would be unlikely to flow between initial disturbance and final stabilization of the feature.

This method would involve excavating the pipeline trench across the dry waterbody, installing a pre-fabricated segment of pipeline in the trench, and backfilling the trench with native material. The trench would be excavated immediately prior to pipe installation to limit construction within the waterbody to 24 hours for crossings less than 10 feet wide and 48 hours for crossings between 10 and 100 feet wide. The trench would be excavated to sufficient depth to provide for at least 4 feet of cover over the pipeline after installation. Excavated materials would be stored at least 10 feet from the edge of the waterbody and temporary erosion control devices would be used to prevent sediment from entering the waterbody. After backfilling, the bottom contours would be restored and the waterbody banks would be stabilized.

Dry-ditch Methods

For waterbodies with flow at the time of crossing, Transco would implement construction methods that would maintain flow while creating a dry working area in which to excavate the trench and install the pipeline.

The flume method involves diverting the flow of water across the construction work area through one or more flume pipes placed in the waterbody. The first step in the flume crossing method would involve placing a sufficient number of adequately sized flume pipes in the waterbody to accommodate the highest anticipated flow during construction. After placing the pipes in the waterbody, sand bags or equivalent dam diversion structures would be placed in the waterbody upstream and downstream of the trench area. These devices would serve to dam the stream and divert the water flow through the flume pipes, thereby isolating the water flow from the construction area between the dams. Flume pipes would be left in place during pipeline installation until final cleanup and restoration of the streambed is complete.

The dam and pump method is similar to the flume crossing method except that pumps and hoses would be used instead of flumes to move water across the construction work area. The technique involves damming of the waterbody upstream and downstream of the trench area. Pumps would be set up at the upstream dam with the discharge line routed through the construction area to discharge water immediately downstream of the downstream dam. Intake screens would be used to prevent entrainment of aquatic resources from the upstream area and energy dissipating devices would be used to minimize erosion and sedimentation at the discharge point in the downstream area. Water flow would be maintained through all but a short reach of the waterbody at the actual crossing. The pipeline would be installed and backfilled. After backfilling, the dams would be removed and the banks restored and stabilized.

Transco may also implement the temporary diversion channel method in which temporary dams would divert flowing water to one portion of the stream channel, allowing dry trench installation of the pipeline to occur in another portion of the channel. As pre-fabricated segments of pipeline are installed and backfilled, the temporary dams would be repositioned to redirect flow and allow dry trench crossing of the waterbody to continue in a phased manner. After the pipeline segment has been installed, the temporary dams would be removed and natural stream flow would be restored.

Transco would install circular culverts where the permanent access road to Compressor Station 206 crosses two small drainage features. During access road construction, grading would be completed to install the culverts with adequate cover to span the drainage features, and drainage swales would be created to convey runoff to the culverts. The culverts would be of sufficient size and design to create a continuous flow-path of the natural channel.

Horizontal Directional Drill Method

The HDD method involves drilling a hole underneath sensitive resources and installing a pre-fabricated pipe segment through the hole. As previously noted, Transco would use the HDD method to install three segments of the Madison Loop. The HDD method would also be used to install the Raritan Bay Loop pipeline beneath the New Jersey shoreline (the Morgan Shore Approach HDD) and the Ambrose Channel (Ambrose Channel HDD), as well as the Short and Long CP Power Cables associated with the Raritan Bay Loop CP system. The Short and Long CP Power Cable HDDs are included in this section because the drilling equipment for these HDDs would be located onshore. The Morgan Shore Approach HDD and the Ambrose Channel HDD near MP 30 of the Raritan Bay Loop are described in section 2.3.3.5. Table 2.3.2-1 lists the HDDs proposed as part of the NESE Project.

TABLE 2.3.2-1

Horizontal Directional Drills Associated with the Northeast Supply Enhancement Project

State/Facility/HDD	Purpose of HDD	Approximate Diameter of Bore Hole (inches)	Length (feet)	Entry Milepost	Exit Milepost	Approximate Duration of Drilling (days)	Approximate Timeframe (quarter/year)
NEW JERSEY							
Madison Loop							
Cheesequake Road HDD	Avoids impacts on road and stream/ wetland complex along the right-of-way	38 – 44 inches	1,900	9.3	8.9	21	Q1 2020
Parkwood Village HDD	Avoids impacts on residential area	38 – 44 inches	2,300	9.9	9.4	25	Q1 2020
Lockwood Marina HDD	Minimized impacts on Cheesequake Creek and Marina	38 – 44 inches	1,785	11.5	11.8	20	Q3 2019
Raritan Bay Loop (Onshore Only)							
Short CP Power Cable HDD	Avoids impacts on the New Jersey Route 35	6 inches	545	12.1	12.0	7	Q3 2020 or after completion of Morgan Shore Approach HDD
Raritan Bay Loop (Onshore to Offshore)							
Morgan Shore Approach HDD	Avoids impacts on New Jersey Transit commuter railroad, roads, nearshore residential communities, and impacts on the shoreline	38 – 44 inches	2,650	12.0	12.5	47	Q2 2020 to Q3 2020
Long CP Power Cable HDD	Avoids impacts on the New Jersey Transit commuter railroad, roads, cultural resources and the shoreline	6 inches	1,830 [a]	12.1	1,200 feet north of MP 12.3	14	Q3 2020 or after completion of Morgan Shore Approach HDD
Raritan Bay Loop (Offshore to Offshore)							
Ambrose Channel HDD	Avoids the primary navigation channel and heavy vessel traffic into and out of New York Harbor	38 – 44 inches	4,645	29.5 [b]	30.4	34	Q3 2020

[a] About 500 feet of the Long CP Power Cable HDD would extend beneath land and the remainder would extend beneath Raritan Bay.

[b] Transco would implement the pilot hole intersect method for installing the Ambrose Channel HDD. This method would involve the use of two drilling rigs, one at MP 29.5 and one at MP 30.4, drilling pilot holes simultaneously toward each other until they intersect midway beneath the seafloor. Relative to drilling fluid hydraulics, there would technically be no HDD exit point, but Transco would assemble and pull the HDD pipeline segment from east to west, or from MPs 30.4 to 29.5.

Transco initially proposed to use the HDD method to install the Quarryville Loop between MPs 1686.1 and 1686.8, which would avoid direct impacts on Conowingo Creek and minimize impacts on the Tanglewood neighborhood, where approximately 15 residential properties abut either side of Transco's existing right-of-way (see section 4.7.3). Transco's proposal was pending the final results of field investigations to confirm the feasibility of the HDD. On September 7, 2017, Transco provided the final feasibility study for the Conowingo Creek HDD which included four geotechnical borings to depths of 125 to 186 feet with laboratory analysis of soil and bedrock core samples, and a geophysical survey to further evaluate soil and bedrock conditions along the HDD drill path.[19] Transco also used the geotechnical and geophysical data to evaluate the use of the Direct Pipe method, another drilling method that uses drilling fluid to install pipeline below ground.

In summary, the geotechnical and geophysical surveys identified fractured bedrock and voids along the drill path which increase the potential for lost drilling fluids in the subsurface environment or inadvertent returns to the ground surface or Conowingo Creek. Transco also determined that homes in the Tanglewood neighborhood obtain their drinking water from private wells, and that the drill path would be within 30 feet of the completion interval of several nearby wells. The feasibility study concluded that the HDD and Direct Pipe methods would pose a high risk to nearby water wells and Conowingo Creek, and that the Direct Pipe method could also result in subsidence along the drill path and potentially damage pipeline coatings. We reviewed the HDD and Direct Pipe feasibility study and agree that these methods would pose an unacceptable risk to drinking water wells or result in other adverse effects. Due to these risks, Transco proposes to use standard overland trenching methods to install the Quarryville Loop between two of the three existing pipelines in its right-of-way through the Tanglewood neighborhood. This EIS evaluates the impacts associated with Transco's proposed overland trench method in this area.

<u>HDD Design and Feasibility</u>

The design and feasibility of an HDD is determined by factors including the length, depth, and curvature (i.e., profile) of the proposed drill; surrounding topography; pipeline diameter; availability and orientation of land on which to assemble the HDD pipeline segment; land use constraints; and geotechnical suitability of the subsurface environment. Transco conducted geotechnical borings to determine the engineering characteristics of geologic materials that would be encountered along the HDD drill paths, and used this information to evaluate the technical feasibility of each HDD, prepare site-specific HDD plans, and assess the potential for an inadvertent release of drilling fluid to occur during the drilling process.[20] Transco's analysis indicates that the three HDDs associated with the Madison Loop and the Short and Long CP Power Cable HDDs are feasible, and that the risk of an inadvertent release of drilling fluid occurring is generally low, except near the drill entry and exit points where the risk would be higher. HDD drilling fluid and the potential for inadvertent returns of drilling fluid during the HDD process are discussed below.

<u>HDD Guidance System</u>

A guidance system typically consisting of two parallel wires laid on the ground surface along the path of the HDD would be used to accurately track the location of the drill cutting head. The wires are small and can be placed across active roads without disrupting traffic. The wires would be installed using foot traffic with only limited hand-clearing of vegetation, or divers in the case of the offshore segment of

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[19] The Conowingo Creek HDD Feasibility Evaluation can be found in file 9 of Accession Number 20170907-5176.

[20] Table 2.3-3 indicates where the site-specific HDD design plans can be found. The geotechnical boring logs and HDD feasibility assessment for the Morgan Shore Approach HDD is available in Resource Report 6 Part 1, FERC Accession No. 20170327-5102, and the HDD feasibility assessments for the Madison Loop HDDs are available in Attachment 5 to Volume 1, FERC Accession No. 20180511-5170. The hydraulic fracture study for the Morgan Shore Approach HDD and Ambrose Channel HDD are available in Attachment A1-3, FERC Accession No. 20170601-5277.

the Long CP Power Cable HDD. The wires would be installed before beginning the HDD and would be removed once the HDD is complete.

Alternatively, Transco may use a full inertial navigation system, which would use electronic sensors near the drill head, to track the progress of the onshore HDDs. The inertial navigation system would not require placing guide wires on the land surface.

Workspaces

Workspace at HDD entry points typically includes the drilling rig, control cab, office, storage trailers, power generators, drill string pipe storage, water trucks, water storage, other heavy equipment, and a drill entry pit. The workspace would also include facilities and equipment to manage drilling fluid and drill cuttings. Because of the short lengths and small diameter of the Short and Long CP Power Cable HDDs, Transco would use small drilling equipment specially designed for use in urban areas, whereas heavier drill rigs and equipment would be needed to install the pipeline HDDs.

The workspace at onshore HDD exit points typically includes the drill exit hole and containment pit, a cuttings return/settlement pit, cuttings separation and reclamation equipment, drill string pipe storage, and heavy equipment. The HDD pipeline segment would also be assembled beginning at the HDD exit point, ready to be pulled back through the borehole when drilling operations are complete. Transco would use its existing or proposed pipeline right-of-way for assembly of the HDD pullback segments to the greatest extent possible, but has identified ATWS for the pullback segments of the Cheesequake Road and Parkwood Village HDDs.

The exit point for the Long CP Power Cable HDD would occur in offshore New Jersey State waters (see page 13A in appendix B). Transco would use a barge-mounted dredge to excavate a pit at the exit point to contain any drilling fluid and cuttings during the HDD process and for installation of the Subsea Anode Sled. After divers install the anode bed, the facility would be backfilled and covered to a depth of at least 4 feet.

Pilot Hole, Reaming, and Pullback

The first step in an HDD is to drill a small diameter pilot hole from the HDD entry point to the HDD exit point. As the pilot hole progresses, segments of drill pipe are connected and inserted into the hole to extend the length of the drill. The location of the drill bit is monitored and steered via the HDD guidance system described above until the pilot hole has been completed.

The pilot hole would then be enlarged using several passes of successively larger reaming tools until the borehole is slightly oversized relative to the diameter of the HDD pipeline segment. After reaming operations are complete, a swab pass would be conducted to condition the borehole and determine if it is ready for the pipeline to be installed. The prefabricated segment of pipeline would then be attached behind the reaming tool on the exit side and pulled back through the drill hole using the drill rig at the HDD entry site. For the onshore HDDs, the HDD pipeline segments would be supported on rollers to facilitate their pullback through the borehole.

For the Madison Loop HDDs and the Short and Long CP Power Cable HDDs, Transco would limit the onshore mobilization, demobilization, and other set-up work to daylight hours Mondays through Saturdays, but would conduct all drilling operations continuously to reduce the potential for the HDD pipeline segment to become lodged.

HDD Drilling Fluid

The HDD method utilizes drilling fluid that is pumped under pressure through the inside of the drill pipe to lubricate the drill bit and convey drill cuttings back to the drill entry point, where it is reconditioned and re-used in a closed, circulating process.

Transco would use a drilling fluid composed of 95 to 98 percent water and 2 to 5 percent bentonite, a naturally occurring clay mineral that is used to thicken the fluid. The bentonite also forms a cake on the rock surface of the borehole, which helps to keep the drill hole open and maintain circulation of the drilling fluid system. Bentonite-based drilling fluid is a non-toxic, non-hazardous material that is also used to construct potable water wells throughout the United States. If needed to optimize drilling operations, Transco may augment the drilling fluid with starch, cellulose, non-toxic polymers, and/or crystalline silica. In general, the additives would be National Sanitation Foundation/American National Standards Institute 60 (NSF/ANSI 60) approved. Upon selecting the HDD contractor, Transco would file on the FERC docket the safety data sheets for all drilling fluid additives for review and approval prior to construction.

Because the drilling fluid is pressurized, it can be lost beyond the immediate vicinity of the drill hole by either overcoming the strength of the overlying geologic materials or by encountering natural fractures or voids that are not readily plugged by the bentonite caking process. This loss of drilling fluid is also referred to as an inadvertent release.

The potential for an inadvertent release is typically greatest during drilling of the initial pilot hole, and decreases once the pilot hole has been completed. The potential for an inadvertent release is also greatest near the drill entry and exit points, where the drill hole has the least amount of ground cover. As indicated in table 2.3-3, Transco provided an Onshore Horizontal Directional Drilling Contingency Plan that details the potential for an inadvertent release to occur during all stages of the HDD process; explains the drilling practices that would be implemented in the event of an inadvertent release; and describes the measures that would be undertaken if drilling fluid would impact the land surface, wetlands, waterbodies, or other resources. In general:

- Transco’s HDD drilling contractor would be required to have a certified drilling fluids engineer/technician on-site to assist in managing drilling fluid during all stages of the HDD drilling process;

- Surface casing may be installed at the drill entry and exit;

- Downhole pressure would be monitored continuously for indications of lost circulation;

- Best management practices would be used to recondition the drilling fluid and maintain downhole flow;

- If circulation is lost, the HDD contractor would cease operation and inspect the drill path for drilling fluid on the land surface or in wetlands and waterbodies. Transco would notify all concerned parties and regulatory agencies. The contractor would make reasonable attempts to reestablish circulation such as manipulating drilling fluid properties. If it is determined that further attempts to establish returns would threaten the HDD installation or are unlikely to be successful, the contractor may implement other measures to reduce the risk of drilling fluid loss including slowing the rate of penetration, drilling or reaming the hole from the other direction, using large diameter casing, or installing drilling fluid relief wells.

- In addition to monitoring the drilling fluid pressure for indications of lost circulation, the drilling contractor will monitor the surface along HDD alignment for signs of inadvertent drilling fluid returns.

- The drilling contractor would have clean-up equipment and materials on-hand if inadvertent drilling fluid returns are observed. Measures would be taken to contain the returns to the extent practicable and clean-up would proceed by hand to the maximum extent possible. Areas affected by drilling fluid would be restored to original condition, in accordance with applicable regulatory agency requirements, or as accepted by Transco and the FERC.

- If drilling fluids are observed in a waterbody, Transco would monitor the area for up to four hours to determine if the drilling fluid hardens and seals off additional returns. Appropriate regulatory agencies and affected landowners would be consulted on the next course of action which could include no further action, placement of underwater containment booms and curtains, or mobilizing a spill response team to conduct clean-up actions in event of excessively large releases.

We have reviewed Transco's onshore HDD designs, feasibility studies, and contingency plan, and conclude that implementation of these construction and mitigation plans would reduce the potential for an inadvertent release of drilling fluids to occur and minimize impacts on resources in the event of a release. Potential impacts of an inadvertent release of drilling fluids on wetlands, waterbodies, and other resources are discussed further in section 4.0.

2.3.2.2 Wetlands

As discussed in detail in section 4.3.4, construction of the NESE Project would impact 11 wetlands in New Jersey and 19 wetlands in Pennsylvania. In general, impacts on wetlands would be avoided and minimized by collocating the Quarryville and Madison Loops with existing pipeline facilities and by limiting the width of the construction right-of-way to 75 feet in wetlands except at one location as indicated in table 2.3-1. Transco would also avoid placing ATWS within 50 feet of a wetland boundary except at certain locations indicated in table 2.3-2, for which Transco provided acceptable site-specific justifications. In addition, Transco proposed the Cheesequake Road and Lockwood Marina HDDs on the Madison Loop to avoid and minimize impacts on wetland and waterbody complexes. Regarding aboveground facilities, Transco sited new Compressor Station 206 primarily on upland areas of the 52.1-acre parcel to minimize wetland impacts.

Wetland crossings would be accomplished in accordance with Transco's Procedures, which includes measures to minimize wetland impacts and facilitate wetland restoration, and in accordance with other applicable federal and state permit requirements. In general, Transco would implement construction procedures similar to those used in upland areas to cross wetlands found to be unsaturated at the time of construction, including segregating and replacing topsoil. In wetlands with saturated soil or standing water at the time of construction, Transco would utilize timber mats or other temporary surface material adjacent to the trench to provide a stable work area and may string and assemble the pipeline crossing segment in an upland workspace to minimize construction time within the wetland. Topsoil segregation would not be conducted in wetlands with saturated soil or standing water.

Wetlands would be crossed as quickly and safely as possible to minimize potential impacts. Except for initial clearing and grading equipment, equipment in wetlands would be limited to that necessary for each stage of pipeline installation. Vehicle and equipment parking and refueling would be prohibited within 100 feet of a wetland boundary. Temporary sediment controls would be installed and maintained throughout construction, and would remain in-place until either permanent controls are installed or restoration of adjacent upland areas is complete. During restoration, permanent trench and slope breakers may be installed as needed to maintain original wetland hydrology and prevent sediment from entering the wetland. Revegetation would proceed in accordance with Transco's Procedures or federal and state permit requirements. Fertilizer, lime, or mulch would not be used unless approved in writing by the appropriate federal or state agency.

Transco's alignment sheets depict the delineated extent of wetlands that would be affected by the loops and the workspace that Transco has requested at each wetland crossing. Additional information regarding wetlands affected by the Project and wetland crossing procedures is discussed in section 4.3.4.

2.3.2.3 Railroad and Road Crossings

The NESE Project would cross 18 roads in Pennsylvania, 11 roads in New Jersey, and 1 railroad in New Jersey. Transco would generally cross major paved highways where traffic cannot be interrupted using the bore or HDD crossing method. Smaller roads with low traffic volume would be crossed by the open-cut method, and then restored to preconstruction condition. The pipeline would conform to DOT standards, typically buried to a depth of at least 5 feet below the road surface, and would be designed to withstand anticipated external loading.

The bore crossing method involves the use of an auger drill to install the pipeline below the ground surface. The bore method requires the excavation of pits on each side of the feature and ATWS to store the spoil from the pits. Depending on permit conditions, the pipe may or may not be cased at road crossings. The bore crossing method allows the roadway to remain in service while the installation process takes place. As a result, there is little or no disruption to traffic at roadway crossings that are crossed by this method. The HDD method is discussed in section 2.3.2.1.

With the open-cut crossing method, the trench is excavated and the pipe installed using the standard cross-country construction methods described above. Temporary closure of the road to traffic and establishment of detours may be required. If no reasonable detour is feasible, at least one lane of the road being crossed would be kept open to traffic.

Road and railroad crossings are discussed in more detail in sections 4.7.1 and 4.8.7.2, and table 4.7.1-7 identifies the proposed crossing method for each road and railroad. Transco would also provide a Traffic and Transportation Management Plan to the FERC for review and approval prior to the start of construction, if the Project is approved.

2.3.2.4 Residential Construction

Transco would implement the construction and restoration measures described in its Plan and detailed on its site-specific Residential Construction Plans (RCPs) (see appendix G) to reduce construction-related impacts in residential areas. In general, Transco would reduce construction workspace, as practicable, to minimize inconvenience to landowners; minimize the clearing of trees; limit workspace to the confines of Transco's existing easement where possible; maintain access for landowners affected during Project construction; and make every effort to ensure that cleanup is thorough. Transco would notify affected residential property owners at least 7 days before the start of construction, and its planned work schedule would typically be Monday through Saturday from 7:00 a.m. to 7:00 p.m. for all onshore construction activities, except for HDD drilling and pullback operations, which would be conducted continuously, and for other miscellaneous activities described in section 2.4. Transco would also limit the time that trenches are left open to the extent practicable, and would complete final grading, topsoil replacement, and installation of permanent erosion controls within 10 days of backfilling the trench. Water trucks would be used to control dust, as needed, and speed limits in residential areas would be strictly enforced.

In addition to the general construction procedures above, Transco would use the following special construction methods to further avoid or reduce impacts on residences:

- Between MPs 1682.5 and 1682.7, and MPs 1686.1 and 1686.8 of the Quarryville Loop, Transco would install the new pipeline between existing pipelines to reduce impacts on residences on both sides of the right-of-way at these locations;

- Transco would use the HDD method to avoid and reduce impacts on residences between MPs 9.4 and 9.9 of the Madison Loop;

- Transco would utilize crossovers to reduce impacts on residences; and

- Transco may use the stove-pipe or drag-section methods, which are designed for construction in restricted workspaces. The stove-pipe method involves installing one pipe segment at a time. Welding, weld inspection, and coating activities would be performed in the open trench, thereby reducing the width of the construction right-of-way. The drag-section method involves trenching, installing a pre-fabricated length of pipe containing several segments, and backfilling, typically in 1 day. Both stove-pipe and drag-section methods would result in the trench being backfilled and/or covered with steel plates or equipment mats or protected by fencing, as necessary, to ensure safety at the end of each day. The length of trench excavation and exposure performed each day typically would not exceed the amount of pipe to be installed in the specific area where either of these methods is used.

Residential construction methods and mitigation practices are discussed in more detail in section 4.7.3.

2.3.2.5 Rugged Terrain

Although limited rugged terrain exists along the Project route, it may be necessary to grade steep slopes to a gentler slope to accommodate pipe-bending. In these areas, the slopes would be cut down to accommodate safe construction and returned to their original contours following construction. In side-slope areas where the Project route crosses laterally across the face of a slope, cut-and-fill grading may be required to establish a safe, flat work terrace. Temporary erosion-control measures in rugged terrain would require closer spacing and frequent maintenance until permanent post-construction erosion-control measures are established.

2.3.2.6 Blasting

Based on its prior pipeline construction experience in the Project area, Transco does not anticipate that blasting would be necessary for Project construction. However, if bedrock is encountered that requires blasting, Transco would file on the FERC docket a Project-specific Blasting Plan, for our review and approval, that describes how blasting would be conducted and the measures that would be implemented to minimize blasting effects. Blasting would be conducted by licensed personnel and in compliance with applicable federal, state, and local regulations. Affected landowners, nearby businesses, and other nearby parties would be notified in advance of blasting activity.

2.3.2.7 Trench Dewatering

Dewatering of the pipeline trench may be required in areas with a high water table or after a heavy rain. All trench water would be discharged into well-vegetated upland areas or properly constructed dewatering structures to allow the water to infiltrate back into the ground. If trench dewatering is necessary in or near a waterbody, the removed trench water would be discharged into an energy dissipation/sediment filtration device, such as a geotextile filter bag or straw bale structure located away from the water's edge, to prevent heavily silt-laden water from flowing into nearby waterbodies or wetlands in accordance with Transco's Procedures, construction plans, and all applicable permits. Trench plugs would be used where necessary to separate the upland trench from adjacent wetlands or waterbodies to prevent inadvertent draining of the wetland or diversion of water from the waterbody into the pipe trench.

2.3.2.8 Foreign Utility Crossings

Transco has identified six foreign utilities that cross the proposed Quarryville Loop and one foreign utility that would cross the Madison Loop (see table 2.3.2-2). Transco is consulting with utility companies to determine the exact locations of utilities in relation to the pipeline loops and protective measures that would be implemented during construction. Any relocation of utilities would be completed by the utility company having jurisdiction and would be supported financially by Transco, as required.

TABLE 2.3.2-2

Foreign Utilities Crossed by the Onshore Loops of the Northeast Supply Enhancement Project

State/Facility/County	Township	Milepost	Utility Name/Type
Pennsylvania			
Quarryville Loop			
Lancaster	Drumore	1681.3	PPL Electric Utilities Corporation/overhead transmission line
		1681.4	PECO Energy Company/overhead transmission line
		1688.5	PECO Energy Company/overhead transmission line
		1689.5	PECO Energy Company/overhead transmission line
		1689.9	PECO Energy Company/overhead transmission line
	Eden	1690.1	PECO Energy Company/overhead transmission line
New Jersey			
Madison Loop			
Middlesex	Old Bridge	9.4	Jersey Central Power & Light/overhead transmission line [a]

[a] Would be crossed using the HDD method. All overhead utilities would be crossed using conventional construction techniques.

2.3.2.9 Winter Construction

The Project may involve construction during the winter. Therefore, Transco developed a Winter Construction Plan to address specialized construction methods and procedures that would be used to protect resources during the winter season (see table 2.3-3). Elements of the Winter Construction Plan include techniques to deal with snow management, working with frozen soils, and managing hydrostatic discharge water under freezing conditions. These techniques also include using temporary erosion- and sediment-control measures to protect against accelerated erosion during spring melt and heavy spring rains. Temporary erosion- and sediment-control measures may include installing sediment barriers, applying mulch or erosion-control matting, temporary seeding, and/or other measures. These temporary controls would be maintained during Project construction and re-installed as necessary until permanent erosion-control devices are constructed and/or permanent stabilization has occurred.

2.3.3 Offshore Pipeline Construction Procedures

The Raritan Bay Loop and associated ancillary facilities would be installed below the seafloor using methods specific to pipeline construction in the offshore environment. As summarized in table 2.3.3-1 and depicted on figure 2.3.3-1, about 1.2 miles (5 percent) of the offshore loop and the Long CP Power Cable would be installed using the HDD method, and the remainder of the pipeline would be installed in a trench created by either a clamshell dredge (7.2 miles, 31 percent) or jet trencher (14.9 miles, 64 percent). A clamshell dredge would also be used to excavate isolated pits on the seafloor for installation of the Subsea Anode Sled associated with the CP system; at the Morgan Shore Approach HDD exit point; and at the entry and exit points for the Ambrose Channel HDD. Divers would utilize hand jetting equipment for constructing across foreign utilities and would use hand jetting equipment and a mass flow excavator at the tie-in between the Raritan Bay Loop and the RDL.

The offshore construction procedures are described in detail below but, in general, the proposed construction method for a particular segment of pipeline was based on water depth; burial depth requirements within designated anchorage areas and maintained shipping channels; and the presence of existing infrastructure including subsea cables.

Considering the above marine navigation and engineering constraints, Transco evaluated various methods to minimize environmental impacts primarily by limiting turbidity and sedimentation and reducing the duration of construction (see section 3.6). In consultation with the NYSDEC and NJDEP, Transco conducted an offshore environmental sampling program to characterize the physical and chemical properties of sediments along the proposed route of the Raritan Bay Loop and a route alternative suggested by the NYSDEC (see section 3.3). Based on the results of the environmental sampling program and inputs including bathymetry, tide, and current data, Transco modeled the magnitude and extent of the total suspended solids (TSS) plume within the water column, the thickness of sediment deposition on the seafloor, and the fate of contaminants in re-suspended sediments that would result from excavation and backfilling activities. The offshore environmental sampling program, sediment and contaminant transport models, and the impact of offshore construction on water quality and aquatic resources, are discussed in sections 4.3.3 and 4.5.2.8.

As indicated in table 2.3-3 and discussed throughout this EIS, Transco provided various Project-specific plans associated with offshore construction. These plans include an Emergency Preparedness and Response Plan that details the measures that Transco would implement in case of severe weather; a Spill Plan for Oil and Hazardous Materials (Spill Plan) that details the actions Transco would undertake to mitigate chemical spills; a Marine Mammal Observer Training and Response Protocol Plan that would minimize the potential to impact marine mammals; an Unanticipated Discovery Plan for Offshore Cultural Resources and an Anchor Handling Plan, which are protective of offshore cultural resources; and an HDD Contingency Plan, which specifies how Transco would respond in the event of an inadvertent loss of drilling fluid. FERC staff and other agencies reviewed and commented on these plans, and we conclude that implementation of these plans would avoid or minimize environmental impacts associated with constructing the Raritan Bay Loop.

TABLE 2.3.3-1

Summary of Offshore Construction Procedures

Construction Method/Facility	Location/Milepost	Length (miles)	Activity Duration (days) [a]
Horizontal Directional Drill (HDD)			
Long CP Power Cable (shore to water)	12.1 – 12.3 [b]	0.2	11
Morgan Shore Approach (shore to water)	12.2 – 12.5 [c]	0.3	47
Ambrose Channel (water to water)	29.5 – 30.4	0.9	34
HDD Total		**1.2 (pipeline)**	
Pipeline Trenching			
Clamshell Dredge	12.5 – 16.6	4.1	79[d]
	17.2 – 18.0	0.8	187 [d]
	24.0 – 25.6	1.6	52 [d]
	33.5 – 33.9	0.4	5[d]
	35.2 – 35.5	0.3	4 [d]
Clamshell Dredge Total		**7.2**	
Jet Trencher	16.6 – 17.2	0.6	2
	18.0 – 24.0	6.0	6
	25.6 – 29.5	3.9	5
	30.4 – 33.5	3.1	5
	33.9 – 35.2	1.3	2
Jet Trencher Total		**14.9**	
Isolated Excavation/Equipment			
Long CP Power Cable HDD Exit Pit and Subsea Anode Sled/Clamshell Dredge	12.3 [b]	-	7 [d]
Morgan Shore Approach HDD Exit Pit/Clamshell Dredge	12.5	-	9 [e]
Neptune Cable Crossing #1/Hand Jet	13.9	-	7 [d]
Ambrose Channel HDD Entry Pit (West)/Clamshell Dredge	29.5	-	8 [d]
Ambrose Channel HDD Exit Pit (East)/Clamshell Dredge	30.4	-	22 [d]
Neptune Cable Crossing #2/Hand Jet	35.2	-	7 [d]
Rockaway Delivery Lateral Tie-in/Mass Flow Excavator (75 percent) and Hand Jet (25 percent)	35.5	-	14 [d]

[a] Excavating the pipeline trench using a clamshell dredge would be completed in one pass prior to laying the pipeline segment on the seafloor. Excavating the trench using the jet trencher may require two passes after laying the pipeline segment on the seafloor. The duration indicated approximates the time for active excavation and includes all trenching passes.

[b] The Long CP Power Cable would begin onshore at the Morgan Meter and Regulating Station near MP 12.1 and extend offshore 1,830 feet to the anode sled approximately 1,200 feet north of MP 12.3. The anode sled would measure approximately 10 feet by 10 feet (less than 0.01 acre).

[c] The Morgan Shore Approach HDD would begin onshore at MP 12.0, cross beneath the New Jersey shoreline at MP 12.2, and exit offshore at MP 12.5.

[d] Also includes duration of backfilling activities.

[e] One day of backfilling activities also included as part of the Long CP Power Cable HDD Exit Pit and Subsea Anode Sled/ Clamshell Dredge duration.

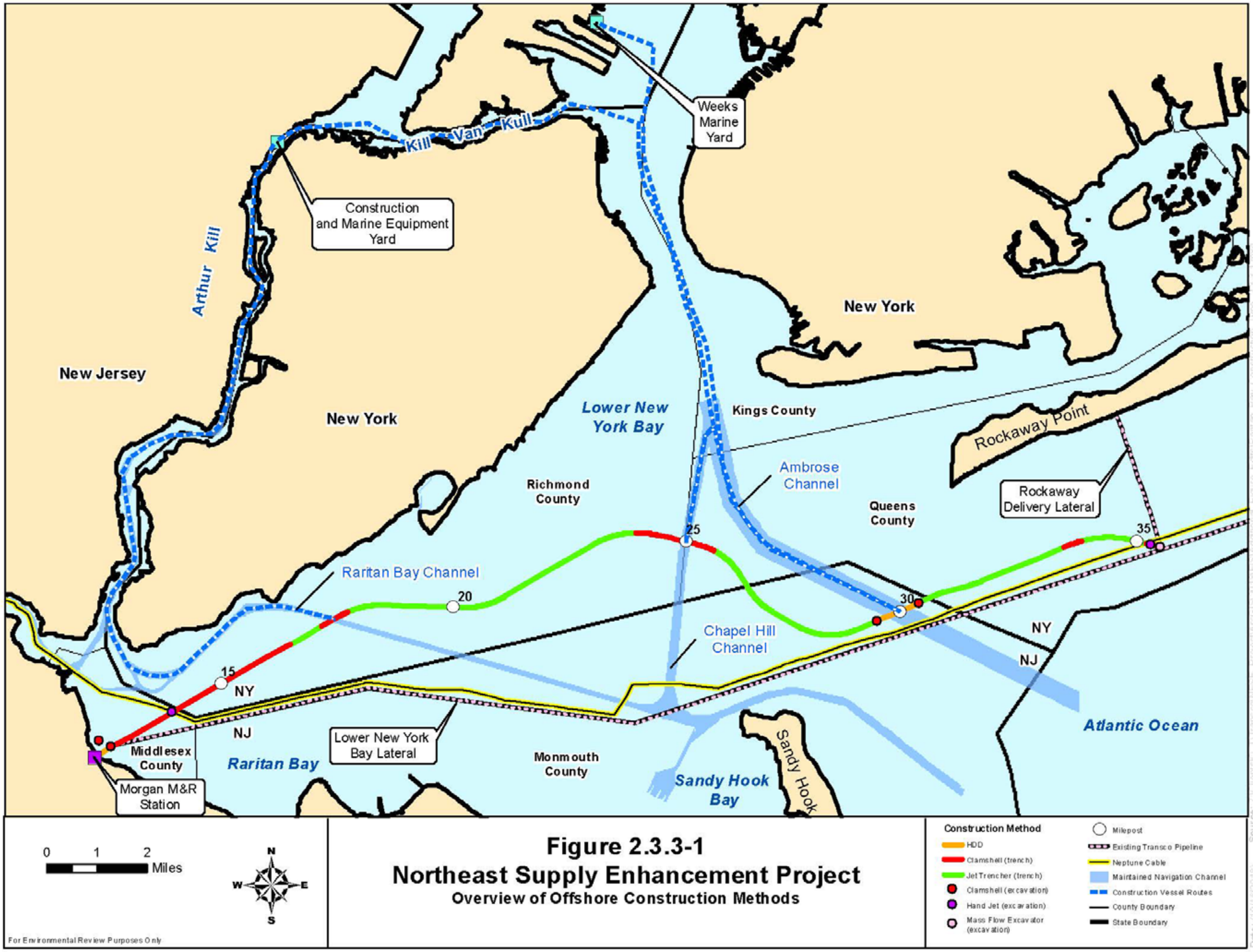


Figure 2.3.3-1
Northeast Supply Enhancement Project
Overview of Offshore Construction Methods

2.3.3.1 Marine Construction Vessels

Construction of the Raritan Bay Loop would require different types and sizes of vessels ranging from small day-use work boats to large supply and construction vessels (see table 2.3.3-2). Construction and supply vessels would originate at the existing C&ME yard on the Arthur Kill in Elizabeth, New Jersey, or the nearby Weeks Marine yard in Bayonne, New Jersey, and would traverse the Arthur Kill or Kill Van Kull until reaching designated shipping channels, which would then be followed to the construction work area (see figure 2.3.3-1). The vessels would then travel and operate within Transco's proposed construction right-of-way along the Raritan Bay Loop. Information on existing levels of marine traffic along the proposed water routes and the frequency of Project-related marine traffic is provided in section 4.8.7.3. All vessels associated with pipeline construction would comply with speed restrictions, approach/distance restrictions, and marine mammal observer protocols required by the NMFS. Transco has also stated that all vessels 65 feet or longer would travel at speeds no greater than 10 knots (11.5 miles per hour) within the right whale Seasonal Management Area (SMA) between November 1 and April 30.

The primary vessels used for construction are described in more detail below and would include clamshell dredge barges, pipelay barges, jack-up barges, crane barges, deck barges, and scows. Support vessels would include crew boats and barges to transport workers, pipeline segments, equipment, and other materials to the construction work area; vessels to support diving activities, hydrostatic testing, dewatering/drying, and surveys; vessels that provide living and dining accommodations for workers; tugs to handle anchors and tow various barges; and security and escort boats. Vessels would be moored by using anchors, spuds, lift legs, or by tethering to other moored vessels. Figure 2.3.3-2 illustrates typical anchor spreads for large construction vessels, and the environmental impacts associated with mooring systems are discussed in sections 4.5.2.8.

Clamshell Dredge Barge

A clamshell dredge consists of two hydraulically powered buckets that open and close together to excavate material. The clamshell dredge is attached to the boom situated on a barge and is raised and lowered to the seafloor by cables. A traditional clamshell bucket includes cutting teeth and other seams from which material can escape as the bucket is raised and lowered. In response to NYSDEC comments, Transco has committed to use an environmental bucket for clamshell excavation work. The design of environmental buckets vary, but they essentially enclose the bucket thereby minimizing material loss as it is raised through the water column, resulting in less turbidity and sedimentation when compared to a traditional clamshell bucket. Transco intends to utilize an environmental bucket for all clamshell excavation work but notes that in some conditions, such as hardpan or highly sandy sediments, the environmental bucket may be unable to effectively excavate the material and a traditional clamshell bucket would then be necessary. The clamshell dredge barge would include differential global positioning system survey equipment (for positioning), an echo sounder (for excavation monitoring), and other equipment needed to support dredging activities. Mooring of the clamshell dredge barge would typically consist of three or four anchors placed at pre-selected locations by a support tug. Figure 2.3.3-3 depicts a typical clamshell dredge barge.

TABLE 2.3.3-2

Marine Vessels used in Offshore Construction

Vessel Type	Primary Activity	Typical Draft (feet) / Dimensions (LxWxH in feet)	Positioning Method
Construction			
Clamshell Dredge [a, b]	Excavate and backfill: • HDD entry and exit pits • Subsea Anode Sled pit • Pipeline trench o MPs 12.5 to 16.6 o MPs 17.2 to 18.0 (Raritan Bay Channel) o MPs 24.0 to 25.2 (Anchorage Area 28 and Chapel Hill Channel) o MPs 25.2 to 25.6 o MPs 33.5 to 33.9 o MPs 35.2 to 35.5 • Backfill	8 / 160 x 60 x 11	Anchors
Pipelay Barge [a, b]	• Morgan Shore Approach HDD (assembly and hydrostatic test of HDD pipe string) [c] • Offshore pipelay MPs 12.5 to 16.5 [c] • Offshore pipelay MPs 16.5 to 35.5 • Ambrose Channel HDD (assembly and hydrostatic test of HDD pipe string)	11 / 390 x 104 x 24	Anchors, anchors with mid-line buoys, or spuds
Jack-up Barge/Liftboat [a, b]	• Ambrose Channel HDD (drilling/reaming and pull-back of HDD pipe string)	10 / 130 x 58 x 10 10 / 190 x 140 x 15	Holdback anchors, lift legs
Crane Barge [a, b]	• Install/remove goal posts and pilings • Install Rockaway Delivery Lateral Tie-in • Expose infrastructure with hand jets • Cover infrastructure and ancillary facilities with protective mats as needed • Pre-commissioning and commissioning	8 / 176 x 75 x 13 8 / 200 x 60 x 15 6 / 70 x 30 x 15	Anchors, anchors with mid-line buoys
Deck Barge	• Install pipe with jet trencher o MPs 16.6 to 17.2 o MPs 18.0 to 24.0 o MPs 25.6 to 29.5 o MPs 30.4 to 33.5 o MPs 33.9 – 35.2	2.5 / 250 x 75 x 15.5	Anchors with mid-line buoys
Scow Barge	• Transport dredge and backfill	6 / 180 x 54x 14	Rafted beside the clamshell dredge
Support			
Marine Support Barge [a, b]	• Morgan Shore Approach HDD support	6 / 300 x 100 x 12	Lift legs or spuds
Construction Support Vessel [a, b]	• Hydrostatic test support • Diver support • Support hand-jetting and mass flow excavation • Pre-commissioning and commissioning	8 / 250 x 80 x 17	Anchors with mid-line buoys
Supply Vessel or Transport Barge [b]	• Transport pipe/material	6 / 300 x 100 x 12	Rafted beside the barge
Miscellaneous	• Tugs to tow/position vessels and position anchors • Security and escort boats • Personnel carriers and utility boats		

[a] Assisted by crew boats.

[b] Assisted by tug boats.

[c] Due to shallow water between MPs 12.5 to 16.5, the pipelay barge would be moored at MP 14.5, where it would assemble and play out the Morgan Shore Approach HDD pullback segment and the pipeline string for MPs 12.5 to 14.5, and then be moved to MP 16.5 where it would assemble and play out the pipeline string for MPs 14.5 to 16.5.

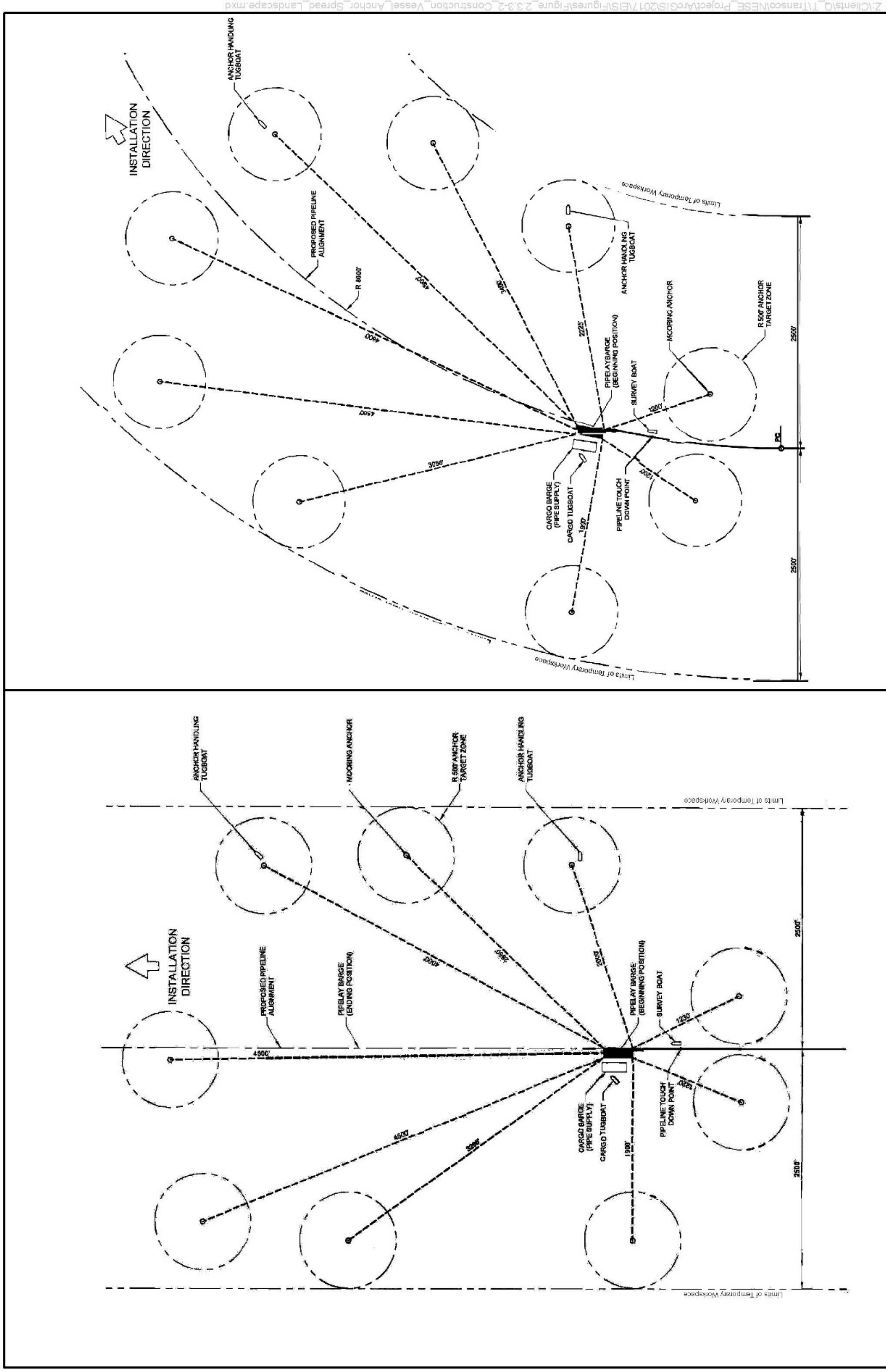


Figure 2.3.3-2
Northeast Supply Enhancement Project
Typical Construction Vessel Anchor Spread

For Environmental Review Purposes Only

Date: (9/22/2017) Source: Z:\Clients\O_T\Transco\NESE_Project\ArcGIS\2017\EIS\Figures\Figure_2.3.3-2_Construction_Vessel_Anchor_Spread_Landscape.mxd

Figure 2.3.3-3 Typical Clamshell Barge

Pipelay Barge

A pipelay barge is a large vessel that includes the facilities necessary to fabricate and lay the Raritan Bay Loop either in trenches previously excavated by the clamshell dredge or directly on the seafloor pending burial. A more detailed description of the pipeline fabrication and pipelay processes is presented in the sections that follow.

A pipelay barge would be used to fabricate the entire length of the Raritan Bay Loop, including the pullback segments of the Morgan Shore Approach HDD and the Ambrose Channel HDD. Shallow water between MPs 12.5 to 16.5 would prevent access or limit the maneuvering of a pipelay barge; in this area Transco would implement the shallow water construction plan described in section 2.3.3.4. For the remainder of the Raritan Bay Loop, the pipelay barge would be positioned using a mooring system of steel cables and anchors (see figure 2.3.3-2). The cables would be equipped with mid-line buoys to keep the cables off the seafloor, thereby minimizing direct environmental impacts. This anchoring system would be used to hold the pipelay barge in place and move the barge precisely along the proposed route by reeling the anchor cables in or out. When the barge progresses to the end of the mooring lines, anchor- handling tugs would move the anchors to new positions ahead of the barge. Figure 2.3.3-4 depicts a pipelay barge in operation while pipe joints are being unloaded.

Figure 2.3.3-4 Typical Pipelay Barge

Jack-up Barge

A jack-up barge is a large vessel in which the working surface is supported above the water on legs that are extended down to the seafloor using a jack-up action. For the NESE Project, the jack-up barge would be equipped with HDD drilling equipment similar to that described in section 2.3.2-1 to construct the Ambrose Channel HDD, and may be used to install and remove protective fender posts and the goal posts associated with the HDD. A more detailed description of these activities is presented in the sections that follow. Figure 2.3.3-5 shows a typical jack-up barge.

Crane Barge

Cranes mounted on barges similar to that depicted on figure 2.3.3-3 would be used to lower and lift various facilities and equipment to and from the seafloor, including protective covers over ancillary facilities, as needed. Crane barges would be moored using anchors with mid-line buoys to keep the anchor cables from impacting the seafloor.

Deck Barge

The jet trencher used to install 14.9 miles (64 percent) of the Raritan Bay Loop would be deployed from a deck barge similar to that depicted on figure 2.3.3-3 using either a crane or other launch/recovery system. Deck barges would be moored using anchors with mid-line buoys to keep the anchor cables from impacting the seafloor.

Figure 2.3.3-5 Typical Jack-up Barge

Scow Barge

Scows would be used to store sediment removed by clamshell excavators during installation of the Raritan Bay Loop and would then transport the dredge material to either a USACE-approved offshore disposal site or to the Weeks Marine or C&ME yards for onshore disposal. Scows would also be used in transporting and placing backfill along the right-of-way. Scows would typically tie-off alongside the clamshell barge and not anchor to the seafloor. Figure 2.3.3-6 shows a typical scow barge.

2.3.3.2 Pipe Delivery

The Raritan Bay Loop would be fabricated from approximately 3,300 40-foot-long pipe joints. The pipe joints would be shipped by sea from a pipe mill manufacturer to the proposed C&ME yard in Elizabeth, New Jersey or the proposed Weeks Marine yard in Bayonne, New Jersey. The pipe would arrive with factory-applied external coating of fusion-bonded epoxy and concrete for weighting, and internal coating of liquid epoxy. The pipe joints for the HDD segments would not be concrete coated but would include an abrasive-resistant exterior coating to protect the pipe during pullback. The pipe joints would be transported by barge to the offshore pipelay barge for fabrication and pipelay.

Figure 2.3.3-6 Typical Scow Barge

2.3.3.3 Pipe Fabrication and Pipelay

The conventional pipelay barge installation method for shallow-water construction is called the S-lay method, which is named for the shape taken on by the pipeline as it is laid from the barge to the seabed. The pipelay barge includes a stinger, a structure that is attached to the deck that supports the pipeline when it leaves the barge deck and helps support the pipe as it transitions from the barge deck to the seabed.

A near horizontal ramp on the barge deck allows space for welding stations, tensioners, a non-destructive examination station, and a field joint-coating station. The assembly and inspection steps are similar to the onshore pipe assembly process described in sections 2.3.1.5 and 2.3.1.6. After the pipe joints are brought to the pipelay barge, the ends of the pipe joints would be aligned and then welded together using multiple passes for a full-penetration weld. Following welding, the previously uncoated ends of the pipe joints would be treated in the field with a company- and industry-approved anti-corrosion coating. Before lowering the pipe, the coating would be inspected and any damaged areas would be repaired.

After several sections of the pipe are welded together and tested on the pipelay barge, the leading end of the pipeline would be lowered down to the seabed. As the pipeline is being lowered, more joints would be welded on to the end until the entire pipeline is fabricated and resting on the seafloor.

2.3.3.4 Shallow Water Construction Plan

As noted above, shallow water between MPs 12.5 and 16.5 would prevent the entry and/or maneuvering of a pipelay barge where the Raritan Bay Loop would be fabricated. To accomplish pipeline installation in this area, Transco would first excavate the Morgan Shore Approach HDD exit pit at MP 12.5 and the trench line for the Raritan Bay Loop from MP 12.5 to MP 16.5 using a clamshell dredge fitted with an environmental bucket. Transco would then construct a temporary fixed platform at MP 12.5 and would moor a pipelay barge at MP 14.5. The temporary fixed platform would consist of three separate structures founded on a total of 18, 36-inch-diameter steel piles and connected by steel trestles, creating approximately 4,600 square feet of deck space. Twenty-two additional temporary piles would be installed near the platform to provide additional support to accommodate pipeline construction loads, protect the platform, provide mooring for support vessels, and to support the Morgan Shore Approach HDD pullback segment as it is installed. The major equipment on the platform would include an HDD drill rig, a small crane, an emergency generator, sheaves, light packs, and a winch that would be used to pull the Morgan Shore Approach HDD pullback segment (2,650 feet) and the segment of the Raritan Bay Loop to be laid between MPs 12.5 and 14.5 as they are assembled and played out from the pipelay barge moored at MP 14.5. As the pipeline segments are assembled they would be lowered into the excavated trench and then pulled towards the temporary fixed platform via the cable and winch system on the platform. A tug would be used to support the tail of the shorter HDD segment as it is pulled into position; a tug would not be needed to support the tail end of the 2-mile-long pipeline segment as the tail end of the segment would terminate at the pipelay barge. Upon completion of assembly and positioning of each segment, the segments would be flooded pending pullback or burial. Transco estimates that the temporary fixed platform would be present at MP 12.5 for approximately 50 days.

The pipelay barge would then be relocated to MP 16.5 where the 2-mile-long section of pipeline between MPs 14.5 and 16.5 would be assembled and played out to tug boats that would tow the segment, floating at the water's surface on buoyancy modules, into position. For safety and to provide added control of the segment, Transco would install 22, 24-inch-diameter guide piles along the tow route. Navigation lights would be placed on each pile and lighted buoys would be spaced 100 meters apart between the guide piles. Once the segment is in position, the buoyancy modules would be removed and the segment laid in the trench pending burial. Transco estimates that 6 days would be necessary to assemble and lay the 2-mile-long segment.

The environmental impacts of the proposed temporary fixed platform, including the installation of temporary support piles, are evaluated in section 4.0. Transco has and will continue to consult with the USCG and Harbor Operations Steering Committee regarding the safe execution of the shallow water construction plan. As noted above and in general, safety elements would include lighting of the temporary fixed platform and along the pipeline segment tow routes, the use of 24-hour picket boats to deter boat traffic from the area, and notices to mariners.

2.3.3.5 Excavation Methods

In general, Transco would use a clamshell dredge and jet trencher to excavate the trench for the Raritan Bay Loop where the pipeline would not be installed by the HDD method, and would use the clamshell dredge to also excavate the HDD exit and entry pits. A hand jet and mass flow excavator would be used to remove sediments over and around existing infrastructure, such as cable crossings or the Rockaway Delivery Lateral Tie-in. Table 2.3.3-3 summarizes the various excavation methods and approximate volumes of sediment that would be disturbed during construction.

TABLE 2.3.3-3

Summary of Excavation Methods and Volumes for the Raritan Bay Loop

Excavation Method/Facility	Location (milepost)	Total Estimated Volume (cubic yards)
Jet Trencher [a]		
Pipeline Trench	16.6 – 17.2	10,952
	18.0 – 24.0	104,798
	25.6 – 29.5	67,944
	30.4 – 33.5	54,559
	33.9 – 35.2	21,785
Subtotal		**260,038** [b]
Clamshell [a]		
Pipeline Trench	12.5 – 16.6	175,673
	17.2 – 18.0	357,502
	24.0 – 25.6	201,886
	33.5 – 33.9	16,790
	35.2 – 35.5	13,152
Long CP Power Cable HDD Exit Pit and Subsea Anode Sled	12.3 [c]	461
Morgan Shore Approach HDD Exit Pit	12.5	9,931
Ambrose Channel HDD Entry Pit (West)	29.5	14,050
Ambrose Channel HDD Exit Pit (East)	30.4	32,450
Subtotal		**821,895**
Hand Jet		
Neptune Cable Crossing #1 [d]	13.9	1,676
Neptune Cable Crossing #2 [d]	35.2	2,085
Rockaway Delivery Lateral Tie-in	35.5	1,510
Subtotal		**5,271**
Mass Flow Excavator		
Rockaway Delivery Lateral Tie-in	35.5	4,530
Subtotal		**4,530**
Total		**1,091,734**

[a] Excavation of the trench using the jet trencher would be completed in two passes after laying the pipeline segment on the seafloor. Excavation of the pipeline trench using clamshell equipment would be completed in one pass prior to laying the pipeline segment on the seafloor.

[b] Sediment disturbed by jet trencher is not excavated or dredged. The majority of the emulsified sediment remains in the trench into which the pipeline is lowered.

[c] The Long CP Power Cable HDD exit and the Subsea Anode Sled would be located about 1,200 feet north at MP 12.3.

[d] Assumes the cables are at sufficient depth to allow minimum 4 feet burial above the pipeline.

Note: The totals shown in this table may not equal the sum of addends due to rounding.

Clamshell Dredge

Transco proposes to use the clamshell dredge to excavate the pipeline trench prior to assembling and laying the pipeline in the shallow water (less than 15 feet deep) between MPs 12.5 and 16.6 (see section 2.3.3.4 for a discussion of Transco's proposed shallow water construction plan). In accordance with USACE requirements, this "pre-lay" process would avoid creating the navigational hazard that would result if the pipeline was assembled first and left to rest on the seafloor pending burial (the "post-lay" process). Transco would also use the clamshell dredge to excavate the Morgan Shore Approach HDD exit pit at MP 12.5 and the Subsea Anode Sled pit near MP 12.3. The spoil from these shallow water excavations would be barged to a USACE-approved offshore site or to shore for disposal at an approved onshore site, rather than side-casting the material and creating a mound that would pose a navigation hazard.

The clamshell dredge and pre-lay process would also be used to excavate and install the pipeline across the Raritan Bay Channel (MPs 17.2 to 18.0) and the Chapel Hill Channel (MPs 24.8 to 25.2). These channels are maintained at a specific depth by the USACE, and post-lay construction would result in the pipeline being situated on the channel floor pending burial. More specifically, the USACE requires a minimum of 15 feet of cover over the pipeline in the Raritan Bay and Chapel Hill Channels. The spoil from these excavations would be barged to a USACE-approved offshore site or to shore for disposal at an approved onshore site.

The Raritan Bay Loop crosses USACE-designated anchorage area 28 between MPs 24.0 and 24.8 (see figure 2.1.1-1). Anchorage area 28 is unmaintained. The USACE requires that the pipeline be buried with a minimum of 7 feet of cover in unmaintained anchorage areas and a minimum of 4 feet of cover outside of designated anchorage areas. Because the jet trencher discussed below would be unable to achieve the required burial depth between MPs 24.0 and 24.8, Transco would use the clamshell dredge to excavate the trench across anchorage area 28. Pending NYSDEC approval, Transco would either side-cast the spoil from the excavation or barge the spoil to a USACE-approved offshore site or to shore for disposal at an approved onshore site. Our analysis assumes side-casting is approved, which would result in greater turbidity and sedimentation in Raritan Bay.

Transco originally proposed to utilize the jet trencher described below to install the pipeline between MPs 25.2 to 25.6 and MPs 33.5 to 33.9. However, in response to NYSDEC regulations regarding the dredging of Class C sediments, Transco now proposes to use a clamshell excavator with an environmental bucket to excavate the pipeline trench in these areas. The spoil from these excavations would be barged to shore for disposal at an approved onshore site.

Transco would also use the clamshell dredge to excavate the Ambrose Channel HDD pits at MPs 29.5 and 30.4 and a short segment of the Raritan Bay Loop from MP 35.2 to the Rockaway Delivery Lateral Tie-in at MP 35.5. Transco would dispose of the spoil from the Ambrose Channel HDD pits at a USACE-approved offshore site or at an approved onshore site and may side-cast the spoil from the segment between MP 35.2 to 35.5, pending NYSDEC approval. Our analysis assumes side-casting is approved between MPs 35.2 to 35.5, which would result in greater turbidity and sedimentation in Raritan Bay.

Section 2.3.3.5 includes information regarding the offshore HDD process and section 2.3.3.10 includes additional information regarding backfilling and dredge disposal.

Jet Trencher

Transco would use a jet trencher to bury 14.9 miles (64 percent) of the Raritan Bay Loop after the pipeline has been fabricated and laid on the seafloor. The jet trencher is a bottom-crawling, remotely operated vehicle with precise controls, video cameras, and operating sensors. An armored umbilical provides power, hydraulics, and communications between the trencher and the control unit located on the anchored barge, and allows the trencher to traverse up to about 3,900 feet laterally before having to reposition the barge.

The jet trencher, which straddles the pipeline, is equipped with two retractable cutting swords, one on each side of the pipeline. During operation, the cutting swords are extended into the seafloor and high-pressure sea water is pumped through a series of small-diameter nozzles on the front/forward side of the swords to loosen sediments beneath the pipeline. Simultaneously, low-pressure sea water is pumped through larger-diameter nozzles on the back/trailing side of the swords, fluidizing the sediments and allowing the pipeline to settle beneath the bottom under its own weight, without excavating a traditional trench. As the trencher advances, the fluidized sediments flow back and cover the pipeline; the trencher can also be equipped with a drag beam to reinstate pre-existing contours. Transco anticipates that it will require two passes with the jet trencher to achieve the 4-foot minimum cover over the pipeline where the trencher would be deployed.

In section 3.6 we evaluate alternative trenching methods for the Raritan Bay Loop. However, the jet trencher offers several environmental advantages compared to other trenching methods, including substantially reduced turbidity, sedimentation, and construction time.

Hand Jet and Mass Flow Excavator

Divers working from an anchored crane barge would use hand-held wands that discharge pressurized seawater to disperse small volumes of sediments where more mechanized methods could damage existing infrastructure such as communication cables, tie-ins between HDD segments and the remainder of the Raritan Bay Loop, and working at the Rockaway Delivery Lateral Tie-In.

The mass flow excavator is a small, submersible suction pump that would be deployed from an anchored crane barge to create the small-scale excavation needed to install the tie-in skid at the Rockaway Delivery Lateral Tie-In. The mass flow excavator would fluidize sediments around the skid, allowing the skid to settle under its own weight, and would cast the sediments through a discharge pipe onto the nearby seafloor where they may be recovered for subsequent backfilling.

2.3.3.6 Horizontal Directional Drilling

The HDD method would be used to install the Raritan Bay Loop pipeline beneath the New Jersey shoreline (the Morgan Shore Approach HDD) and the Ambrose Channel (Ambrose Channel HDD), as well as the Long CP Power Cable associated with the Raritan Bay Loop CP system. The process for drilling The Long CP Power Cable HDD is discussed in section 2.3.2.1 because the drilling equipment for this HDD would be located onshore; the excavation, installation, and backfilling of the associated Subsea Anode Sled is discussed in section 2.3.3.6.

The entry point for the Morgan Shore Approach HDD would be located onshore at MP 12.0 and drilling would proceed toward the east, crossing beneath the New Jersey shoreline near MP 12.2 and exiting offshore in Raritan Bay, near MP 12.5 (see page 13A in appendix B) whereas the Ambrose Channel HDD would occur entirely in the offshore environment (see page 23 in appendix B). As described below, Transco plans to implement the pilot hole intersect method to reduce the potential for an inadvertent release of drilling mud during construction of the Ambrose Channel HDD. This method involves using two separate HDD drill rigs that drill simultaneously toward each other until the pilot holes meet approximately mid-way along the total drill path. Although this method involves two "entry" points for completing the pilot hole, the drilling location on the west side of the Ambrose Channel at MP 29.5 is considered the entry point and the location on the east side of the channel at MP 30.4 is considered the exit point, and would include the pre-assembled HDD pullback segment of pipeline.

Transco conducted geotechnical soil borings to determine the engineering characteristics of geologic materials that would be encountered along the Morgan Shore Approach and Ambrose Channel HDD drill paths, and used this information to evaluate the technical feasibility of each HDD, prepare site-specific HDD plans, and assess the potential for an inadvertent release of drilling fluid to occur during the drilling process.[21] These studies indicate that the HDDs are feasible and that there is a relatively low risk of inadvertent returns to occur except near the HDD entry and exit points. As discussed in more detail below, Transco has included specific HDD design and construction methods to minimize the potential for

[21] The geotechnical boring logs for the Morgan Shore Approach and Ambrose Channel HDDs are available in Resource Report 6 Part 1, FERC Accession No. 20170327-5102. The HDD drill plans are available in Attachment 18, Volume 2, FERC Accession No. 20170327-5102. The hydraulic fracture analyses are available in Attachment A1-3, FERC Accession No. 20170601-5277.

an inadvertent release to occur, and has a provided site-specific contingency plan the details the procedures that would be implemented in the event of an inadvertent release.

In general, the construction of the Morgan Shore Approach HDD and the Ambrose Channel HDD would be accomplished using similar methods as described in section 2.3.2.1 as follows:

- Guide wires would be laid on the seafloor along the planned drill paths, or a full inertial navigation system would be used to accurately guide the HDD cutting head, resulting in little or no impact on the seafloor between the exit and entry pits. Guide wires would be removed after completion of the HDDs.

- The onshore workspace needed at the Morgan Shore Approach HDD entry point would be similar to that described for the other onshore HDDs associated with the Madison Loop. The offshore workspace on the seafloor for the Morgan Shore Approach HDD would include the HDD exit pit and the area needed to lay down the 2,650-foot-long HDD pullback segment, which would be assembled aboard a pipelay barge prior to initiating the HDD and laid within the trench previously excavated by clamshell dredge for subsequent installation between MPs 12.5 and 16.5 (see section 2.3.3.4 for a discussion of Transco's proposed shallow water construction methods between MPs 12.5 and 16.5).

  The offshore workspace on the seafloor of the Ambrose Channel HDD would include the HDD entry and exit pits, and the area needed to lay down the 4,645-foot-long HDD pullback segment, which would be assembled aboard a pipelay barge prior to initiating the HDD and laid on the seafloor in New Jersey and New York state waters to the east of the HDD pit at MP 30.4 pending pullback. In its application, Transco stated that the prefabricated HDD string would be hydrostatically tested and remain parked on the seabed awaiting pullback into the reamed HDD hole. Due to strong currents in the area, Transco would secure the HDD string pending pullback by tethering the string to 22, 24-inch-diameter temporary piles installed between MPs 30.5 to 31.8 (see table 2.3.3-4). Based on the current construction schedule, Transco would lay the Ambrose Channel HDD string during the third quarter of 2020, with the crossing (including set-up, pull-through, and hydrostatic testing) occurring during the second and third quarters of 2020.

- The processes of drilling the pilot hole, reaming and conditioning the borehole, and pulling back the prefabricated segment of pipeline would be similar to that described in sections 2.3.2.1 and 2.3.3.3, except as noted as follows.

  - Using precise guidance systems, Transco would implement the pilot hole intersect method for the Ambrose Channel HDD in which two HDD drilling rigs drill simultaneously toward each other until their respective pilot holes intersect. Once the pilot holes intersect, one drill string would be withdrawn and the other would follow it out to initiate reaming operations. The primary purpose of the intersect method is to minimize the potential for an inadvertent release by utilizing temporary, small-diameter surface casing at both the HDD entry and exit locations and reducing the annular pressure exerted on the borehole during drilling of the pilot hole. The surface casing would extend from the jack-up barges into the seafloor, enclosing and isolating the pilot hole drilling process from the surrounding sediments. The hydraulic fracture analysis indicates that implementing the pilot hole intersect method would result in a factor of safety against an inadvertent release of at least 2.0 over the entire length of the Ambrose Channel HDD; if the annular pressure is maintained at levels which would achieve a factor of safety of greater than 1.0, hydraulic fracture should be prevented. As an added measure against an inadvertent release, Transco would extend the HDD exit and entry pits approximately 400 feet back along the HDD alignment in an effort to contain any drilling fluid that might reach the seafloor.

- Transco would also install large-diameter surface casing at the Morgan Shore Approach HDD onshore entry to reduce the potential for an inadvertent release to occur. In addition, Transco would extend the HDD exit pit for approximately 300 feet back over the HDD alignment in an effort to contain any drilling fluid that might reach the seafloor.

- Because drilling activity associated with the Morgan Shore Approach HDD and the Ambrose Channel HDD would occur onboard marine vessels or structures, Transco would install a series of "goal posts" at the HDD entry and exit points to support the HDD drill string and surface casing from the deck of the drilling barge or platform to the seafloor. Five sets of goalposts would be installed at strategic locations between the barge and seafloor at each HDD location, and the casing and drill string would rest on cross members between the vertical posts. The goal posts would consist of hollow steel piles, 24 inches in diameter, and would be installed using a vibratory device unless they can sink under their own weight to a suitable depth in the seafloor. As noted above and as detailed in table 2.3.3-4, Transco would install other temporary pilings to support construction of the Raritan Bay Loop. A total of 163 piles would be installed, including 111 piles in New Jersey waters and 52 piles in New York waters. The great majority of piles would be installed using vibratory hammers; diesel impact hammers may be used to install some piles at the HDD exit and entry points and at the Rockaway Delivery Lateral Tie-in. All piles would be removed after construction operations are complete. Impacts on marine resources associated with installation and removal of these pilings are discussed in sections 4.5.2.8 and 4.6.3.

Drilling fluid similar to that utilized for the onshore HDDs would be used in constructing the offshore HDDs, consisting of 95 to 98 percent fresh water and 2 to 5 percent bentonite. Transco may utilize small volumes of non-petroleum additives to optimize drilling operations and reduce the potential for inadvertent returns to occur. Transco would file on the FERC docket the safety data sheets for all drilling fluid additives for review and approval prior to construction, and would also provide the safety data sheets to applicable state agencies. The fresh water would be obtained from a municipal source and would be transported to the Ambrose Channel HDD location by marine vessel. The drilling fluid would be made up onboard the drilling vessels and pumped down through the drill string to lubricate the cutting head and create a mud cake on the borehole wall as the fluid flows back toward the entry point.

TABLE 2.3.3-4

Pile Driving Associated with the Raritan Bay Loop [a]

						Installation				Removal		
Milepost	Pile Number(s)	State	Purpose	Diameter (inches)	Quantity	Installation Method	Driving Time Per Pile (min/pile) [b]	Quarter of Installation	Duration (days) [c]	Removal Time (min/pile)	Quarter of Removal	Duration (days) [c]
Morgan Shore Approach HDD												
12.5	1 - 18	NJ	Temporary fixed platform for the Morgan Shore Approach HDD.	36	18	Vibratory Hammer	V - 15	Q2	4.5	30		
						Diesel Impact Hammer	I - 52-62 [d]					
12.5	19 - 22	NJ	Provide additional lateral capacity for pipeline pulling winch.	36	4	Vibratory Hammer	V - 15	Q2	2	30	Q3	3
						Diesel Impact Hammer	I - 52-62 [d]					
12.5	23 - 26	NJ	To tie up and breast support barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15	Q2	2	15		
12.5	27 - 30	NJ	To tie up and breast water barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15			15		
12.5	31 - 40	NJ	Support HDD string.	24	10	Vibratory Hammer	V - 15	Q2	3	5	Q3	3
Neptune Power Cable Crossing												
13.9	41 - 48	NJ	Provide separation between the Neptune Power Cable and the pipeline during shallow water pipelaying activities.	10	8	Vibratory Hammer	V - 15	Q2	2	15	Q3	1.5
Miscellaneous Support												
14.6 to 16.6	49 - 70	NY	Control pipeline during surface tow between MP14.5 to MP16.5.	24	22	Vibratory Hammer	V - 15	Q2	5	15	Q3	1.5
28.6 to 29.9	71 - 82	NJ	Assist the pipelay barge with mooring in the vicinity of the Ambrose Channel.	34	12	Vibratory Hammer	V - 15	Q3	3	30	Q3	2

TABLE 2.3.3-4 (cont'd)

Pile Driving Associated with the Raritan Bay Loop [a]

Milepost	Pile Number(s)	State	Purpose	Diameter (inches)	Quantity	Installation: Installation Method	Installation: Driving Time Per Pile (min/pile) [b]	Installation: Quarter of Installation	Installation: Duration (days) [c]	Removal: Removal Time (min/pile)	Removal: Quarter of Removal	Removal: Duration (days) [c]
Ambrose Channel HDD West Side												
29.4	83 - 85	NJ	Landing of small barges/vessels alongside prior to fender piles being installed.	36	3	Vibratory Hammer	V - 15	Q2/Q3	1.5	15	Q3	0.5
29.4	86 - 93	NJ	Provide additional lateral capacity for HDD pipeline pull.	36-60	8	Vibratory Hammer Diesel Impact Hammer	V - 15 [e] I - 38 [d]	Q2/Q3	4	30		0.5
29.4	94 - 97	NJ	To tie up and breast support barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15	Q2/Q3	1.5	15		1
29.4	98 - 101	NJ	To tie up and breast water barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15			15		
29.4 to 29.5	102 - 113	NJ	Support HDD string.	24	12	Vibratory Hammer	V - 15	Q2	1.5	5	Q3	2
Ambrose Channel HDD East Side												
30.5 to 31.8	114 - 135	NY	Secure HDD string while awaiting pullback.	24	22	Vibratory Hammer	V - 15	Q3	5	15	Q3	0.5
30.5	136 - 138	NJ	Landing of small barges/vessels alongside prior to fender piles being installed.	36	3	Vibratory Hammer	V - 15	Q2	0.5	15		0.5
30.5	139 - 142	NJ	To tie up and breast support barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15		1	15		1
30.5	143 - 146	NJ	To tie up and breast water barge alongside HDD operations.	36-48	4	Vibratory Hammer	V - 15			15		
30.4 to 30.5	147 - 156	NJ	Support HDD string.	24	10	Vibratory Hammer	V - 15	Q2	1.5	5	Q3	2
30.5	163	NJ	Assist the pipelay barge with mooring when recovering the HDD tail string at Ambrose East.	60	1	Vibratory Hammer	V - 15 [e]	Q3	0.5	15	Q3	1
Rockaway Delivery Lateral Tie-in												
34.5 to 34.9	157 – 160	NY	Assist the pipelay barge with mooring in the vicinity of the Rockaway Manifold.	34	4	Vibratory Hammer Diesel Impact Hammer	V - 15 I - 52 [d]	Q3	3	15	Q3	2

TABLE 2.3.3-4 (cont'd)

Pile Driving Associated with the Raritan Bay Loop [a]

						Installation				Removal		
Milepost	Pile Number(s)	State	Purpose	Diameter (inches)	Quantity	Installation Method	Driving Time Per Pile (min/pile) [b]	Quarter of Installation	Duration (days) [c]	Removal Time (min/pile)	Quarter of Removal	Duration (days) [c]
Neptune Power Cable Crossing												
35.2	161 - 162	NY	Ensure temporary stability of the pipeline at the crossing location.	10	2	Vibratory Hammer	V - 15	Q2	1	15	Q3	1

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

Key:
I = inclined
min = minutes
V = vertical

Drilling fluid and cuttings would be deposited within the HDD entry and exit pits as drilling progresses. Transco estimates that approximately 9,400 gallons of drilling fluid would be deposited in the Morgan Shore Approach HDD exit pit during drilling of the pilot hole, and an additional 1,155 cubic yards of combined drilling fluid and cuttings would be deposited in the pit during reaming, swabbing, and pullback operations. At the Ambrose Channel HDD, a total of approximately 689,000 gallons of drilling fluid would be deposited in the entry and exit pits during pilot hole drilling, and an additional 14,300 cubic yards of combined drilling fluid and cuttings would be deposited in the pits during reaming, swabbing, and pullback operations. Transco proposes to cover the drilling fluids and cuttings in the HDD entry and exit pits with supplemental backfill material, if necessary, to restore pre-construction bottom contours (see section 2.3.3.10).

The density of seawater is 64.2 pounds per cubic foot, whereas the density of the drilling fluid would range between 65 and 89 pounds per cubic foot. Thus, the majority of drilling fluid would remain in the pits. Bentonite is extremely fine-grained and thus, some drilling fluid could potentially become entrained in the nearby water column. This effect is expected to be minimal based on current velocity data and considering that bentonite would tend to flocculate when mixing with seawater. In addition, Transco has designed the entry and exit pits to contain all of the estimated drilling fluid plus an additional 25 percent, further reducing the potential for drilling fluid to leave the HDD entry and exit pit areas. Transco also noted that no visible turbidity plumes were observed and no elevated TSS was measured at the down-current compliance point during similar HDD activity during construction of the Rockaway Delivery Project.

Similar to our discussion in section 2.3.2.1, Transco's site-specific Offshore Horizontal Directional Drill Contingency Plan details the construction procedures that would be implemented to reduce the potential for an inadvertent release to occur during drilling, and the measures that would be undertaken in the event of an inadvertent release. As discussed above, the overall potential for a significant loss of drilling fluid into Raritan Bay and Lower New York Bay is low, however, we discuss the potential impact of a drilling fluid release on aquatic resources in section 4.5.2.8.

2.3.3.7 Ancillary Facilities

Long CP Power Cable and Subsea Anode Sled

As noted in section 2.1.1.1, CP of the Raritan Bay Loop would include the installation of a Subsea Anode Sled below the seafloor in Raritan Bay, about 1,000 feet offshore and 1,200 feet north from MP 12.3. The anode sled would be served by the 1,830-foot-long Long CP Power Cable, which would be installed using the HDD method described in section 2.3.2.1.

Prior to initiating the HDD, Transco would use a clamshell dredge to excavate approximately 461 cubic yards of sediment to create a pit to contain the estimated 788 gallons of drilling fluid and cuttings that would be generated during the HDD process, and to install the pre-fabricated Subsea Anode Sled. After completion of the HDD and pullback of the Long CP Power Cable, divers would connect the Long CP Power Cable to the Subsea Anode Sled. Excavated dredge material would be disposed of at an approved site and supplemental material from an approved source would be used to bury the facility with a minimum of 4 feet of cover.

Rockaway Delivery Lateral Tie-in

The facilities associated with the Rockaway Delivery Lateral Tie-in consist of a tie-in skid, tie-in valve spool, and four additional tie-in spools. Transco would first temporarily turn off the RDL gas supply for safety and in coordination with National Grid. Using hand-jetting equipment, divers would then uncover the existing RDL subsea manifold and remove the sandbags. The tie-in skid would be pre-fabricated prior to delivery to the work area and other elements of Rockaway Delivery Lateral Tie-in would be fabricated to specific lengths and hydrostatically tested on the crane barge or similar work vessel. The facilities would be lowered to the seafloor and installed by divers, and gas supply would be restored to the RDL.

As with the Neptune Cable crossing, concrete mattresses would be placed at the Rockaway Transfer Point to accommodate installation of new spools that would cross over existing spools as part of the tie-in design, and to protect the existing spool during new pipeline installation and maintain vertical separation between the new and existing spools. After construction, all facilities would be buried with a minimum of 4 feet of cover or provided equivalent protection by concrete or similar mattresses.

2.3.3.8 Subsea Cable Crossings

The Raritan Bay Loop would cross one active offshore cable, the Neptune Cable, twice, which is believed to be buried at a depth of about 6.4 feet below the seafloor at MP 13.9 and 5 feet below the seafloor at MP 35.2.

Transco plans to install the pipeline over the Neptune Cable to provide a minimum of 18 inches of separation between the cable and the pipeline, and would cover the crossing with concrete mattresses to provide the equivalent protection of 4 feet of sediment. To avoid damaging the Neptune Cable, a diver would use a hand jet to expose the cable and excavate surrounding sediments. Pre-formed concrete mattresses or the equivalent would then be placed in excavated areas on both sides of the cable by a barge-mounted crane, assisted by divers to ensure proper positioning. The mattresses would form a bridge over which the pipeline is laid to maintain vertical separation between the pipeline and existing cable and support the pipeline such that weight is not applied to the cable.

Transco provided a Cable Crossing Plan that details how the Neptune Cable would be crossed (see table 2.3-3). Transco would finalize this plan with its construction contractor to include an alternative crossing design as a contingency. Once the plan is finalized, Transco would submit it to the owner of the Neptune Cable for review before beginning pipeline construction near the crossing. We have added a recommendation in section 4.7.7.2 that Transco should file the final Cable Crossing Plan and documentation of consultation with the cable owner with the Commission prior to construction.

Transco initially identified 18 other historic subsea cables potentially within the offshore construction workspace but did not identify any cables in subsequent remote sensing surveys conducted in conjunction with marine cultural resources investigations. In addition, at the time that the historic cables were installed (between the mid-1800s and mid-1900s), the common practice was to insulate offshore cables with gutta percha, a naturally occurring latex material. Research indicates that cables insulated with gutta percha were subject to cracking and puncture, which accelerated their degradation in the offshore environment (Burns, 2010; 2016). Cables were also subject to regular breakage in the shallow waters of Raritan Bay and New York Harbor, and without regular maintenance, fell into disrepair, became disarticulated, and were further buried beneath sediments. As a result, it is unlikely that intact, historic subsea cables remain in the Project area. As discussed in section 4.9.1.2, the New Jersey Historic Preservation Office (NJHPO) and New York SHPO concurred and did not require further investigation of historic offshore cables.

2.3.3.9 Hydrostatic Testing

The Raritan Bay Loop would be hydrostatically tested before and after it is installed to ensure it is capable of operating at the design pressure. Also, the HDD section of the Morgan Shore Approach HDD and Ambrose Channel HDD would be tested at least twice: when the pipeline section is laid on the seafloor, and then following the completion of the HDD pullback. Nearly all of the water used for these tests (approximately 3.5 million gallons) would be saltwater obtained from the ocean, although a small amount of fresh water obtained from a municipal source would be used to test the Morgan Shore Approach HDD segment of pipeline after installation. The seawater would be withdrawn at a fill rate of approximately 2,350 gallons per minute (gpm) and filtered through a 200-size mesh screen (mesh opening of 0.0029 inch or 0.07 millimeter). The water intakes would be positioned about 10 feet below the surface in depths greater than 20 feet, and mid-way in the water column at shallower depths. An oxygen scavenger and non-oxidizing biocide would be added to the seawater to prevent corrosion of the pipeline interior, and a non-toxic florescent dye would be added to help detect potential leaks. The potential for environmental impact on aquatic resources due to these additives is discussed in section 4.5.2.8.

Hydrostatic test water would be pressurized in the pipe in accordance with DOT requirements as set forth in 49 CFR 192 and held for a minimum of 8 hours. Any loss of pressure that cannot be attributed to other factors (e.g., temperature changes) would be investigated. Any leaks that are detected would be repaired, after which the pipeline would be retested. Following the completion of each test the water would be discharged back to the ocean through a multi-port diffuser in accordance with applicable standards and permits, such as the New York State water quality standards and the NYSDEC water quality certificate.

2.3.3.10 Dredge Disposal and Backfilling

With the possible exception of portions of the trench excavation across USACE-designated anchorage area 28 (MPs 24.0 to 24.8) and excavation of the pipeline trench between MPs 35.2 and 35.5, Transco proposes to dispose of all dredge material excavated by clamshell at approved onshore and offshore sites, pending final regulatory approval based primarily on contaminant concentrations in the dredge material. Transco proposes to dispose of acceptable material at the USACE-managed Historic Area Remediation Site (HARS), a 15.7 square nautical mile area in the Atlantic Ocean, approximately 7.7 nautical miles south of Rockaway, New York. The HARS previously received contaminated sediments and other materials during 63 years of disposal activity, and the USACE is now capping the area with dredged material that meets certain USACE and EPA chemical criteria and which would not cause significant undesirable effects, including through bioaccumulation. In September 2017, Transco submitted an application to the USACE for a permit under section 103 of the MPRSA to transport and dispose of dredge material at the HARS and continues to consult with the USACE regarding potential use of the HARS. For dredge material determined unsuitable for disposal at the HARS, Transco has secured preliminary agreement to dispose of the material at licensed onshore facilities in Kearney and Jersey City, New Jersey. Transco may side-cast dredge material derived from portions of anchorage area 28 and between MPs 35.2 and 35.5 and re-use this material as backfill if approved by the NYSDEC; otherwise, these dredge materials would also be disposed of at approved onshore or offshore sites.

Transco would require supplemental material to backfill the pipeline trench, HDD pits, and other areas. Transco proposes to obtain the necessary backfill from a vendor or vendors that have current permits from the USACE to dredge sediment from the Ambrose Channel for commercial applications. The environmental impacts on aquatic resources associated with backfill dredging were assessed by the USACE during the permitting process. We include the impacts of backfill dredging on aquatic resources in our evaluation of cumulative impacts in section 4.11; however, we include the air emissions that would result from backfill dredging by the vendor(s) in our General Conformity analysis in section 4.10.1.4. Transco indicates that, once the backfill material is brought to the surface by the vendor(s), it would be placed onto Transco-controlled scows for transport to the pipeline right-of-way for placement. Therefore, the environmental impacts of transporting and placing the backfill material on aquatic resources are analyzed in sections 4.5 and 4.6, and the air emissions associated with dredging, transport, and placement of backfill are included in section 4.10.1.4 and appendix I.

As previously noted, Transco has committed to utilize an environmental bucket for clamshell excavation and would prevent scow overflow in areas where NYSDEC Class C sediments would be disturbed, resulting in an estimated 0.5 percent sediment loss. Transco would also implement other practices to reduce turbidity and sedimentation, such as opening the clamshell bucket near the seafloor to accurately place backfill material. In response to NYSDEC comments, Transco also evaluated the use of a tremie line[22] to place backfill but concluded that the use of a clamshell bucket and other best management practices would result in less turbidity and sedimentation than would use of a tremie line.

After the Raritan Bay Loop and associated ancillary facilities are installed and backfilled, Transco would conduct a hydrographic survey to confirm that required burial depths were achieved, and would use the clamshell dredge to place any additional backfill material, if needed. If areas remain where the required burial depth cannot be achieved, the pipeline and ancillary facilities would be covered with concrete or similar mattresses, assuming that 1 foot of mattress cover is equivalent to 2 feet of soil cover.

Transco is continuing to consult with the USACE, EPA, and state agencies regarding dredge disposal sites, but has secured preliminary agreement to dispose of all dredge material at two licensed, onshore facilities, if necessary. In section 4.5.2.8 we recommend that Transco identify the final dredge disposal sites and provide documentation of all necessary regulatory approvals prior to construction.

2.3.4 Compressor Station Construction Procedures

Construction at existing Compressor Station 200 would require modifications to equipment within the existing compressor building as well as installation of new facilities, which include one compressor and related ancillary equipment. About 29.0 acres would be disturbed during construction, of which about 4.2 acres would be retained for operation. All construction activity would occur on land owned by Transco. Construction at new Compressor Station 206 would impact about 27.2 acres, of which 23.4 acres would be retained for operation (this includes the access road and interconnecting pipelines to Transco's adjacent Mainline system. Construction of Compressor Station 206 would occur within a 52.1-acre Transco-owned parcel, and construction of the access road and interconnecting pipeline facilities would occur on land for which Transco has obtained right-of-way.

Transco has stated that all buildings and facilities would be designed, constructed, and maintained in accordance with applicable DOT specifications in 49 CFR 192.163 and in compliance with the International Building Code, American Society of Civil Engineers – 7. Final building designs and material selection would be based on climate, operating conditions (including extreme weather), and in compliance with any noise and land use permit requirements.

Prior to construction, all workspaces and any environmental resources would be marked in the field. Appropriate erosion controls would then be installed and the construction workspaces would be cleared of vegetation and graded to create a level work area, prepare for the installation of building foundations and slabs, and storm water management. Buildings and equipment would be constructed on reinforced concrete foundations designed to withstand the operating loads.

We received numerous comments expressing concern that Compressor Station 206 could be damaged by periodic blasting activity at the Trap Rock Quarry, a surface mine the nearest face of which is about 0.4 mile southwest of the proposed compressor building. As discussed in section 4.11.4, Transco completed a Blasting Vibration Analysis to characterize the blasting-related vibrations that could be experienced at the compressor station site, and would incorporate the results of the study in the final

[22] This method would use a vertical or near vertical pipe to place the backfilled material by gravity feed below water level.

foundation designs. Transco would also install vibration sensors on the compressors themselves, which would detect vibrations in excess of normal operation as indicated in manufacturer's specifications.

After foundation construction, the buildings would be erected and equipment would be constructed and installed by skilled laborers in accordance with applicable building codes and manufacturer's instructions. Construction would be conducted in compliance with applicable state and local building codes and subject to inspection for permitting authorities. After construction is largely complete, final grading, landscaping, and exterior finishing would be completed, including placement of pavement and installation of security fencing and exterior lighting. Natural gas piping, valves, and other applicable equipment would be hydrostatically tested as described in section 2.3.1.9 to insure operational integrity prior to initiating operation.

As indicated in section 1.4, Transco would connect Compressor Station 206 to non-jurisdictional utilities including municipal water and electric power that would be installed underground within the right-of-way for the new access road to the facility. We received numerous comments from residents and local government officials stating that the existing municipal water system in the vicinity of Compressor Station 206 would be unable to provide adequate resources in the event of fire at the facility. Transco has indicated that Franklin Township will complete repairs to the municipal water system in the area in 2018, after which it would be able to serve existing customers in the area. Whereas Compressor Station 206 would receive potable water from the municipal system, Transco states that a fire hydrant would not be necessary at the station as the most effective means to address a natural gas fire would be to shut off the gas source, which would be accomplished by an automated emergency shut-down system. Safety of the proposed facilities is further discussed in section 4.11.

We also received comments concerning the storage and management of hazardous chemicals at Compressor Station 206, and the potential for operation of the facility to contaminate surrounding soil and/or water resources. As discussed in section 4.3.1.8, Transco would install facilities specifically designed and constructed to safely contain hazardous chemicals including diesel exhaust fluid (urea), oily water, and natural gas condensate, and would respond to any hazardous material spills in accordance with its Project-specific Spill Plan. Several commenters also believed that the NESE Project would transport oil, which would pose a contamination hazard in the event of a release, whereas the Project would transport consumer quality natural gas which would not pose an appreciable hazard to soil or water quality in the event of an underground release. Natural gas, if leaked from the pipeline, is lighter than air and would dissipate into the atmosphere.

2.4 CONSTRUCTION WORKFORCE AND SCHEDULE

Construction of the NESE Project would commence in the third quarter of 2019 in order to meet Transco's targeted in-service date of December 1, 2020 (see section 1.1). This assumes that the Commission approves the Project and issues a Notice to Proceed with construction. Onshore construction would generally extend for about 12 months through the second quarter of 2020, with most restoration completed by the end of 2020. At Compressor Station 206, construction would continue through the third quarter of 2020, with restoration extending into the second quarter of 2021. Offshore construction would commence in the second quarter of 2020 and would continue for about 9 months, with backfilling completed by the end of 2020.

As noted in section 2.3.2.4, onshore construction would typically occur from 7:00 a.m. to 7:00 p.m. Monday through Saturday except for HDD drilling and pullback operations, which would be conducted on a continuous basis to minimize the potential for HDD failure. Transco also identified the following areas where construction outside of the typical work hours is planned:

- Withdrawal of water from Cheesequake Creek and pipe filling for the Madison Loop hydrostatic test, with associated safety lighting (two consecutive nights);

- Pipe filling for the Quarryville Loop hydrostatic test (segment 1), with associated safety lighting (two consecutive nights);

- Pipe filling for the Quarryville Loop hydrostatic test (segment 2), with associated safety lighting (two consecutive nights);

- Dewatering and drying pig runs for the Raritan Bay Loop and associated safety lighting (four non-consecutive nights); and

- The guided bore crossing of the Garden State Parkway (Madison Loop MP 11.2) to comply with the New Jersey Turnpike Authority License to Cross, and associated safety lighting (up to four weeks of continuous construction).

Transco also identified certain unplanned situations where construction outside of typical work hours may be necessary:

- Completion of a tie-in initiated during typical work hours;

- Completion of a wetland or waterbody crossing associated with unforeseen conditions (in anticipation of heavy upstream precipitation, unexpected constructability issues, etc.);

- Maintenance work on construction equipment needed for the next day;

- Heating of concrete when the mean temperature falls below 40 degrees Fahrenheit (°F);

- Re-pressurization, if needed, to continue an in-progress hydrostatic test; and

- Completion of post-hydrostatic test drying pig runs initiated during typical work hours.

Transco expects to use up to 620 workers for the onshore construction and up to 300 workers for the offshore construction. Of this total, Transco expects that approximately 345 (65 percent) of the onshore workers and 60 (20 percent) of the offshore workers would be local hires. Most of the estimated 240 non-local workers associated with offshore construction would live on an offshore vessel during extended construction shifts; non-local workers associated with onshore construction would seek accommodations in the Project area. Following construction, two new workers would be hired to operate Compressor Station 206.

2.5 ENVIRONMENTAL TRAINING, INSPECTION, AND COMPLIANCE MONITORING

2.5.1 Coordination and Training

Transco would incorporate the construction, mitigation, and restoration measures identified in its permit applications and supplemental filings as well as additional requirements of federal, state/ commonwealth, and local agencies into its construction drawings and specifications. Transco would also provide copies of applicable environmental permits, construction drawings, and specifications to its construction contractors. An adequate number of copies of the construction drawing package would be distributed to Transco's inspectors and to the contractor's supervisory personnel. If the contractor's performance is unsatisfactory, the terms of the contract would allow Transco to stop work in progress and require the contractor to begin remedial work.

Transco would implement an environmental training program tailored to the proposed Project and specific construction requirements. Transco would provide annual training for its EIs and other company construction personnel in the implementation of its Plan and Procedures and other mitigation measures. The EIs for the Project would be drawn from Transco's inspector pool or possibly from qualified contractors. Transco would train the field construction personnel and construction contractor's personnel before and during construction of the Project. While this training would focus on implementation of Transco's Plan and Procedures for the NESE Project, as appropriate, it would also include instruction on permit conditions and requirements as well as the implementation of other mitigation measures, as appropriate.

2.5.2 Environmental Inspection

For purposes of quality assurance and compliance with mitigation measures, applicable regulatory requirements, and Transco specifications, Transco would be represented on each construction spread for the Project by a Chief Inspector. The Chief Inspector would be assisted by one or more Craft Inspectors and at least one EI. The EI position would be a full-time position. The EI would report directly to Transco's Chief Inspector and would have stop-work authority.

Transco's EIs would be trained in, and responsible for ensuring that construction of the Project complies with the construction procedures and mitigation measures identified in Transco's application, the FERC Certificate, other environmental permits and approvals, and environmental requirements in landowner easement agreements. EIs would have peer status with all of Transco's other construction inspectors, have the authority to stop activities that violate the conditions of the FERC Certificate, other permits, or landowner requirements, and have the authority to order the appropriate corrective actions. The FERC staff acknowledges that the role of Transco's EIs is to ensure the Project is constructed in accordance with the requirements imposed by FERC and other regulatory agencies. However, the EI's role should not be mistaken for FERC abdicating its inspection authority to Transco. In addition to Transco's environmental inspection program, we would conduct regular, typically monthly, inspections of construction activities associated with the Project and post summary reports from the inspections into the docket. As appropriate, we would coordinate our inspections with other agencies.

At a minimum, an EI would be responsible for:

- maintaining status reports and training records;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and stabilization needs in all areas;
- locating dewatering structures and slope breakers to ensure they would not direct water into sensitive areas such as known cultural resource sites or sensitive species habitat or violate permit requirements;

- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/ or sediment near the point of discharge in a wetland or waterbody. If such deposition is occurring, the EI would stop the dewatering activity and take corrective action to prevent a reoccurrence;

- advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive soil rutting;

- verifying that the soil is certified free of noxious weeds and soil pests;

- determining the need for and ensuring that erosion controls are properly installed to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;

- inspecting and ensuring the maintenance and repair of temporary erosion control measures;

- ensuring restoration of contours and topsoil;

- identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance; and

- keeping records of compliance with conditions of all environmental permits and approvals during active construction and restoration.

Any issues of environmental non-compliance that cannot be solved in the field would be addressed by Transco's Construction Manager, who would be assigned to the Project from Transco's engineering and construction department. If technical or management assistance is required, construction headquarters staff would request assistance from the appropriate Transco department or division. Routine reporting or specific communication with the FERC staff regarding design, installation, and maintenance of the facilities described in the EIS would be the responsibility of Transco's natural resources department. Transco's operations department would be responsible for long-term Project maintenance and regulatory compliance.

2.5.3 Post-Approval Variance Process

The pipeline alignment and work areas identified in the EIS should be sufficient for construction and operation (including maintenance) of the Project. Minor route realignments and other workspace refinements sometimes continue past the project-planning phase and into the construction phase. As a result, the Project locations and areas of disturbance described in this EIS may require refinement after approval of the Project (assuming the Project is approved). These changes could involve minor route realignments for the proposed pipelines, shifting or adding ATWS or staging areas, or adding additional access roads.

We have developed a procedure for assessing impacts on those areas that have not been evaluated in the EIS and for approving or denying their use. For the NESE Project, biological and cultural resources surveys were conducted using a survey corridor larger than that necessary to construct the facilities. If Transco proposes to modify the configuration of workspace or add new workspace subsequent to any Project approval, these areas typically would be within the previously surveyed area.

The request for route realignments or ATWS locations along with a copy of the survey results and/ or documentation of consultations with the appropriate resource agency would be documented and forwarded to the FERC in the form of a "variance request." Typically, no further consultation with resource agencies would be required if the requested change is within previously surveyed or otherwise cleared areas and no sensitive environmental resources or managed areas are affected. The procedures used for assessing impacts from proposed workspace outside surveyed areas and for approving their use are similar to those described in this EIS. Additional surveys, analyses, and resource agency consultations would be performed, as necessary, to ensure that impacts on biological, cultural, and other sensitive resources would be avoided or minimized to the maximum extent practicable. After Transco completes any required surveys, analyses, and consultations, the required documentation would be forwarded to the FERC for evaluation. Such requests would require review and written approval by the Director of OEP.

2.5.4 Post-construction Monitoring

After construction, Transco would conduct follow-up inspections of all disturbed areas, at a minimum, after the first and second growing seasons to determine the success of restoration, and would continue monitoring areas until revegetation thresholds are met, temporary erosion control devices are removed, and restoration is deemed successful. Restoration of upland areas would be considered successful if the right-of-way vegetation is visually successful in density and cover of non-nuisance vegetation, surface conditions are similar to adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. For at least 2 years following construction, Transco would submit quarterly reports to the FERC that document any problems identified during the inspections or by landowners, and describe the corrective actions taken to remedy those problems. We would also conduct periodic restoration inspections until restoration is deemed complete.

In accordance with Transco's Procedures, Transco would monitor the success of wetland revegetation annually for the first 3 years (or as required by permit) after construction or until wetland restoration is successful. Wetland revegetation would be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas or as compared to documented, pre-project conditions. If revegetation is not successful at the end of 3 years, Transco would develop and implement a plan to actively revegetate and restore the wetland with native wetland herbaceous and/or woody plant species.

After construction, the FERC, cooperating agencies, and/or other agencies would continue to conduct oversight inspection and monitoring to assess the success of restoration. If it is determined that the success of any of the restoration activities are not adequate at the end of the respective timeframes, Transco would be required to extend their post-construction monitoring programs and implement corrective actions as deemed necessary.

We recognize that during and after construction, unforeseen issues or complaints may develop that were not addressed during the environmental proceedings at the Commission, and it is important that landowners have an avenue to contact Transco's representatives. Should the Project be approved, we are recommending in section 5.2 that Transco file an environmental complaint resolution procedure describing how affected landowners can voice concerns to Transco during construction and operation of the NESE Project, and the process that Transco would implement to ensure that landowner issues and complaints received during and after construction are resolved in a timely and efficient manner.

2.6 OPERATION, MAINTENANCE, AND EMERGENCY RESPONSE

Transco would operate and maintain the Project in compliance with DOT regulations provided in 49 CFR 192, the FERC guidance in 18 CFR 380.15, and the maintenance provisions of Transco's Plan and Procedures. Operation and maintenance considerations for the proposed facilities are described below.

2.6.1 Pipeline Facilities

Operational activity on the Project would include maintaining, inspecting, cleaning, and (as necessary) repairing the pipeline loops. Onshore, periodic ground inspections by pipeline personnel would identify soil/sediment erosion that may expose the pipe, dead vegetation that may indicate a leak in the line, conditions of the vegetative cover, unauthorized encroachment on the pipeline (e.g., buildings and other substantial structures), and other conditions that could present a safety hazard or require preventive maintenance or repairs. Transco may also utilize aerial patrols to monitor the pipeline right-of-way. The frequency of ground inspections or aerial patrols would comply with DOT regulations and would be based on pipeline Class locations and other factors (see table 2.6.1-1).

TABLE 2.6.1-1

Maximum Interval Between Patrols

Class Location	At Highway and Railroad Crossings	At All Other Places
1 and 2	7.5 months, but at least twice each calendar year	15 months, but at least once each calendar year
3	4.5 months, but at least four times each calendar year	7.5 months, but at least twice each calendar year
4	4.5 months, but at least four times each calendar year	4.5 months, but at least four times each calendar year

[a] As defined in 49 CFR 192.5 (see section 4.11.1).

Offshore, Transco has designed the Raritan Bay Loop and ancillary facilities to operate in the saltwater environment of Raritan Bay and Lower New York Bay, and to accommodate potential stresses associated with tropical storm events. Transco would utilize the results of its sediment transport model in combination with post-construction survey to verify that adequate burial depth is maintained over the subsea facilities. Transco would use the results of year-over-year post-construction surveys to develop an offshore pipeline inspection schedule for the operating life of the Project.

Responses to conditions observed during inspection would be taken, as necessary, in accordance with the appropriate approved plan, regulatory requirement, FERC Certificate condition, and/or permit condition. Because of the depth of the pipeline loops where installed by the HDD method, Transco does not propose to maintain the ground surface above the loops, but would retain a permanent right-of-way over the HDD segments. Transco also does not anticipate the need to conduct maintenance activities that would disturb the seafloor over the Raritan Bay Loop.

The proposed pipeline loops would be designed and constructed to accommodate inspection using in-line inspection tools known as pigs. Within 10 years of being placed into service, and every 7 years thereafter, the proposed loops would be inspected with a pig in accordance with 49 CFR 192. These internal inspections would be capable of detecting internal and external damage to the pipeline loops. Transco would also periodically monitor and inspect the CP systems to ensure adequate corrosion protection of the facilities.

To ensure that the public is aware of the pipeline right-of-way and to facilitate inspections and emergency response, if necessary, Transco would maintain the vegetation within upland portions of the permanent right-of-way as herbaceous cover at a frequency of approximately once every 3 years. Transco would also maintain a 10-foot-wide swath of vegetation within upland and wetland portions of the permanent right-of-way centered over the pipelines approximately every year and would reserve the right to selectively cut and remove trees within wetlands in the permanent right-of-way to maintain pipeline integrity. Based on consultation with the Pennsylvania and New Jersey Field Offices of the FWS, routine vegetation maintenance of the right-of-way would not be conducted between April 1 and August 31 to avoid impacts on nesting birds. Following construction, Transco would allow temporary workspaces and ATWS to revert to pre-construction land use and cover.

The onshore portion of the pipeline facilities would be marked at key points. The markers would clearly indicate the presence of the pipeline, call out the words “Natural Gas,” and provide a telephone number and address where a company representative may be reached in the event of an emergency or before any excavation in the area of the pipeline by a third party. Additionally, Transco participates in all One-Call systems.

2.6.2 Aboveground Facilities

Transco would operate and maintain Compressor Stations 200 and 206 in accordance with DOT regulations at 49 CFR 192. Transco personnel would routinely calibrate equipment and instrumentation, inspect critical components, and perform scheduled and routine maintenance of equipment and grounds. Corrective actions would be taken, as necessary, if problems are identified.

3.0 ALTERNATIVES

We evaluated alternatives to the NESE Project as required by NEPA and FERC policy. As discussed below, we evaluated the No Action Alternative, the use of other natural gas transmission systems in the region, modifications to Transco's existing system, pipeline route alternatives, alternative locations for and access to Compressor Station 206, the use of EMD compressors at Compressor Station 206, and different trenching methods to install the Raritan Bay Loop in the offshore environment. We did not identify or analyze any alternative areas for onshore or offshore disposal of dredge material derived from excavation of the Raritan Bay Loop, or alternative locations for supplemental backfill. However, as detailed in section 2.3.3.10, Transco has applied to the USACE to transport and dispose of excess dredge material at the HARS if suitable based primarily on contaminant concentrations, If disposal of excess dredge material in the HARS is not approved, Transco has secured preliminary agreements to dispose of all excess dredge material at licensed onshore facilities in Kearney and Jersey City, New Jersey. Since issuance of the draft EIS, Transco now proposes to obtain necessary backfill from vendor(s) that have current permits from the USACE to dredge sediment from the Ambrose Channel for commercial applications. In section 4.5.2.8 we recommend that, if the Project is approved, Transco file the final locations of onshore and offshore dredge disposal sites, and other related information, prior to construction.

The alternatives we considered were identified by Transco during Project development; by FERC staff; by regulatory agencies including the USACE, NMFS, and NYSDEC; and by landowners, local government officials, and other stakeholders in areas that would be affected by the Project. Many commenters generally recommended relocating components of the NESE Project, including Compressor Station 206, but did not identify any specific alternative locations for the facilities.

We applied the following three criteria in evaluating whether to recommend an alternative over Transco's proposed facilities:

- The alternative must meet the stated purpose of the NESE Project. As detailed in section 1.1, the purpose of the NESE Project is to provide 400,000 Dth/d of incremental natural gas capacity to National Grid at the Rockaway Transfer Point. National Grid distributes natural gas to residential, commercial, and industrial customers, and has stated that the capacity of the Project is needed to help meet forecasted demand for additional natural gas supply in its downstate New York market beginning in the 2019/2020 heating season. However, to facilitate compliance with construction timing restrictions associated with certain marine species, Transco now proposes to begin service on December 1, 2020.

  While Transco's proposed in-service date was not a critical factor in our review of alternatives, alternatives that would take many years to plan, permit, and construct would be considered unable to meet the purpose of the NESE Project within a reasonable timeframe.

  Some commenters recommended that we evaluate the potential for energy efficiency, energy conservation programs, and renewable energy (e.g., wind, solar) to eliminate or meet the need for the NESE Project. We recognize that energy conservation and efficiency programs help to reduce energy demand and that renewable energy is playing an increasing role in meeting the region's energy needs. However, because the purpose of the Project is to transport natural gas to meet National Grid's needs, and renewable energy sources or reductions in demand are not transportation alternatives, they are not considered further in this analysis.

- The alternative must be technically and economically feasible and practical. Although project costs are not typically a factor in our environmental analysis, the Commission must consider the impact that a proposed project has on the rates paid by customers for natural gas transmission services, which are ultimately borne by consumers. Therefore, an alternative that would clearly render a project uneconomic or significantly more costly than the proposed action would be considered economically infeasible and impractical.

  Some commenters recommended that proposed Compressor Station 206 be constructed underground to minimize noise and improve public safety. Whereas such an alternative may be technically feasible, it would not be practical. Furthermore, as discussed in section 4.10, Compressor Station 206 would comply with our noise regulations and, as discussed in section 4.11, the facility would not represent a significant threat to public safety. For these reasons, we do not consider underground construction of Compressor Station 206 to be a viable alternative to Transco's proposal.

- The alternative must provide a significant environmental advantage over the comparable component of the NESE Project. Determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on common resources as well as on resources that are not common to the alternatives being considered. The determination must then balance the overall impacts and all other relevant considerations, including impacts on the human environment. An alternative that results in equal or minor environmental advantages would not lead us to shift impacts from the landowners and local government jurisdictions affected by the Project to a different set of landowners and jurisdictions.

The USACE assisted us in preparing this EIS and may use the document in its permit decision making process. When making a decision on whether to issue its permit, the USACE must consider whether a proposed project represents the least environmentally damaging, practicable alternative pursuant to CWA section 404(b)(1) guidelines. The term "practicable" means that the alternative is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall purpose of the project. The USACE may not permit the discharge of dredged or fill materials into waters of the U.S. if there is a practicable alternative to the discharge that would result in less adverse impact on the aquatic ecosystem, unless the alternative would result in other significant adverse environmental consequences.

Our evaluation of alternatives is based on information provided by Transco, affected landowners, and other stakeholders; publicly available information; our visits to the Project area; consultations with federal and state resource agencies; and our expertise and experience regarding the siting, construction, and operation of natural gas transmission facilities and their potential impact on the environment. To ensure a consistent environmental comparison and to normalize the comparison factors, we generally used desktop sources of information (e.g., Geographic Information Systems (GIS) data, aerial imagery) and assumed the same right-of-way widths and general workspace requirements. Therefore, some the information presented in this section relative to the Project may differ from the information presented in section 4.0, which is based on Project-specific information such as field surveys and engineered drawings. It is also important to note that not all alternatives warrant the same degree of evaluation. Through environmental comparison and exercise of our professional judgement, each alternative was evaluated until it became clear that the alternative would be unable to meet the stated purpose of the NESE Project; would be technically and economically infeasible or impractical; or would not offer a significant environmental advantage over the Project. Those alternatives that appeared to be reasonable with the potential for significantly less environmental impact are reviewed in greater detail below.

3.1 NO ACTION ALTERNATIVE

The Commission has two courses of action in processing applications under section 7 of the NGA: 1) deny the requested action (the No Action Alternative); or 2) grant the Certificate, with or without conditions. Some commenters on the draft EIS suggested that we conduct a more rigorous, resource-specific comparison of the No Action Alternative to Transco's proposal, similar to our review of pipeline route alternatives below. Such a comparison would not be further informative because, if the No Action Alternative is selected by the Commission, the proposed facilities would not be constructed and none of the environmental impacts from the NESE Project as disclosed in section 4.0 would occur. It is also clear that, if the No Action Alternative is selected, the stated purpose of the Project would not be met, likely causing National Grid to seek other sources of natural gas to meet their forecasted need for additional supply. As discussed in section 3.2, other existing interstate natural gas transmission systems in the region could not meet the purpose of the NESE Project without expansion and/or construction of new, greenfield facilities. These facilities would be of similar or greater scope than the facilities proposed by Transco, resulting in similar or greater environmental impact and, therefore, would not be preferable to the NESE Project. Also, as discussed above, we do not consider the use of renewable sources of energy or energy conservation and efficiency programs to be viable Project alternatives. For these reasons, we do not recommend the No Action Alternative.

3.2 SYSTEM ALTERNATIVES

System alternatives would utilize existing or other proposed natural gas transmission systems to meet the objectives of the NESE Project. Implementing a system alternative would make it unnecessary to construct all or part of the Project, although some modifications or additions to an existing transmission system or other proposed transmission system may be necessary. In section 3.2.1 we analyze the potential to utilize a different interstate natural gas transmission system, other than the Transco system, to meet the purpose of the NESE Project. In section 3.2.2, we evaluate other modifications to Transco's system that could potentially replace components of the NESE Project. We did not identify any other new, proposed natural gas transmission systems in the region that could be modified to meet the purpose of the NESE Project.

3.2.1 Other Natural Gas Transmission Systems

Several commenters suggested that the purpose and need of the NESE Project could be met by utilizing other, existing natural gas transmission systems. Excluding Transco's system, six other interstate natural gas transmission systems are present in the region of the NESE Project. The six systems are owned by the Millennium Pipeline Company, LLC (Millennium); Tennessee Gas Pipeline Company, L.L.C. (TGP); Columbia Gas Transmission, LLC (CGT); Algonquin Gas Transmission, LLC (AGT); Iroquois Gas Transmission System, LP (IGT); and Texas Eastern Transmission, LP (TETCO). Figure 3.2.1-1 depicts the systems and table 3.2.1-1 summarizes the systems and identifies the nearest facility within each system to the Rockaway Transfer Point.

As depicted on figure 3.2.1-1 and summarized in table 3.2.1-1, the IGT system, AGT system, TGP system, CGT system, and Millennium Pipeline are 25 to 43 miles north to northwest of the Rockaway Transfer Point at their nearest approach. The extension of any of these systems to the Rockaway Transfer Point would require pipeline construction of at least those lengths in the densely populated urban environment in and around New York City, which would result in significant socioeconomic impacts on thousands of residents and businesses, as well as disruption to local and regional transportation systems. The expansion of any of these systems would reduce the length of offshore pipeline when compared to the NESE Project; however, each would require crossing at least one other major, highly utilized waterbody prior to reaching Raritan Bay and Lower New York Bay.

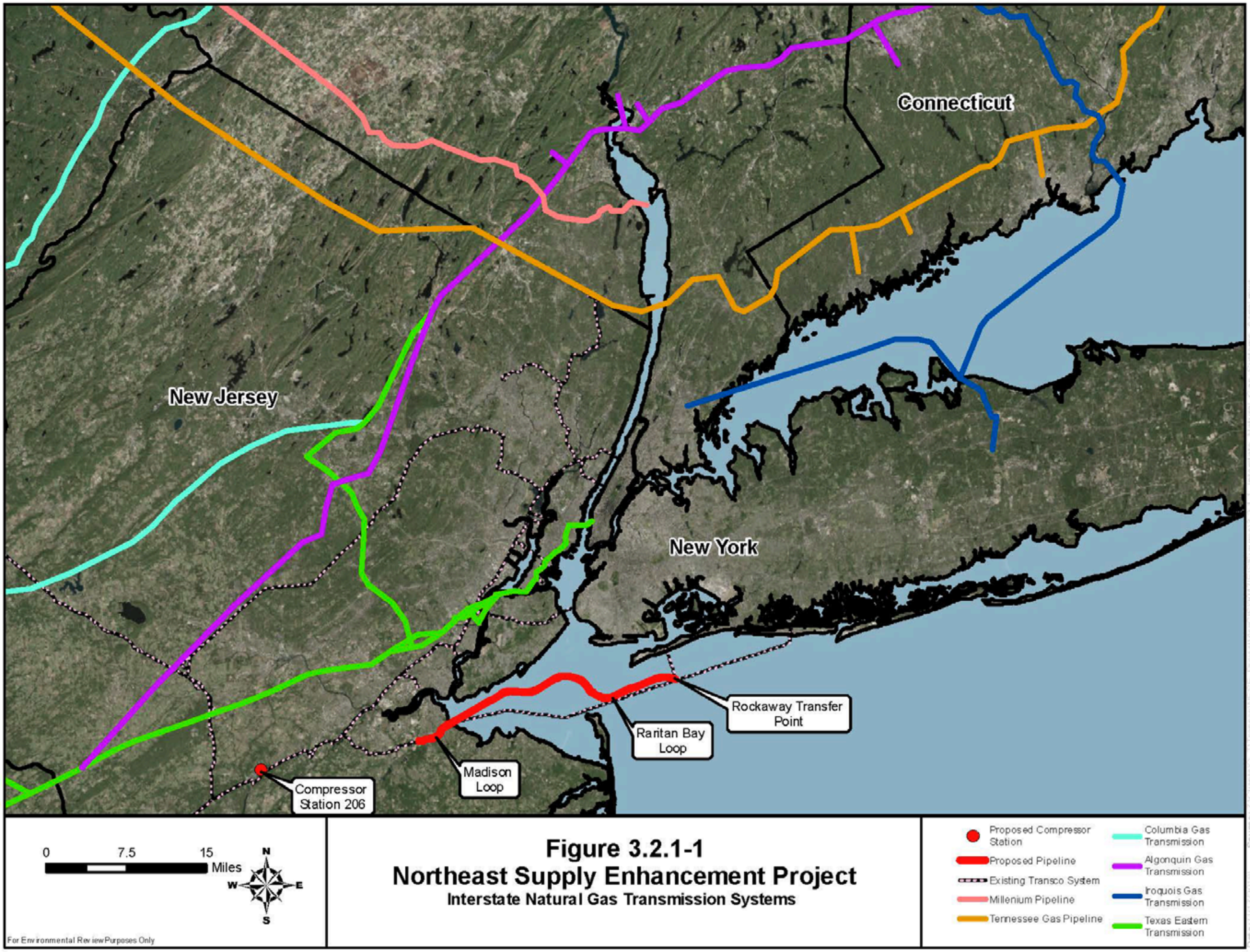


Figure 3.2.1-1
Northeast Supply Enhancement Project
Interstate Natural Gas Transmission Systems

TABLE 3.2.1-1 **Other Interstate Natural Gas Transmission Systems in the Northeast Supply Enhancement Project Region**				
Pipeline	Average psig [a]	Pipeline Capacity in the Region (Dth/d) [b, c]	Unsubscribed Capacity at the Facility Closest to the Rockaway Transfer Point (Dth/d) [c]	Nearest Facility to the Rockaway Transfer Point (miles/direction)
Millennium Pipeline	1,200 [d]	525,000	85,000 [e]	43 NNW
Columbia Gas Transmission	650	261,000	109,000 [f]	37 NW
Tennessee Gas Pipeline	800	377,000	8,800 [g]	35 N
Algonquin Gas Transmission	750	1,475,000	N/A	35 NW
Iroquois Gas Transmission	1,440	520,000	133,000 [h]	25 N
Texas Eastern Transmission	1,102	1,500,000	N/A	18 NW

a Source: EIA, 2015 (unless otherwise noted).
b Source: EIA, 2009.
c One dekatherm equals approximately 1,000 standard cubic feet of natural gas.
d Source: FERC, 2016.
e Source: Millennium Pipeline Company, LLC, 2017.
f Source: Columbia Gas Transmission, LLC, 2017.
g Source: Tennessee Gas Pipeline Company, L.L.C., 2017.
h Source: Iroquois Gas Transmission System, LP, 2017.
N/A = Not available.

The nearest approach of the TETCO system to the Rockaway Transfer Point is about 18 miles to the northwest, on Staten Island. Extension of the TETCO system to the Rockaway Transfer Point would require installing at least 7 miles of pipeline in densely populated areas on Staten Island, resulting in impacts on thousands of residents and numerous businesses, as well as disruption to local and regional transportation systems. Expansion of the TETCO system would reduce the length of offshore pipeline construction when compared to the NESE Project, but would still require approximately 15 miles of pipeline construction in the offshore environment.

Using any other interstate natural gas transmission system would avoid construction of the Quarryville Loop, Madison Loop, new Compressor Station 206, and the modifications to existing Compressor Station 200 on Transco's system. However, due to combinations of new pipeline length, existing average pressure, and lack of sufficient unsubscribed capacity, the expansion of any of the other interstate transmission systems would also likely require new or modified compression facilities and additional looping to meet the contracted gas volume and delivery pressure of the NESE Project resulting in similar or greater environmental impacts.

Based primarily on the greater socioeconomic and residential impacts associated with pipeline construction in highly urbanized areas as noted above, the expansion of any of the other existing interstate transmission systems would not provide a significant environmental advantage when compared to the Project. In addition, due to the extensive planning, permitting, public outreach, and special construction methods that would be required, the expansion of any other system would result in an unreasonable delay to meet the requested in-service date of the customers of the NESE Project. For these reasons, we conclude that expanding any of the other interstate natural gas transmission systems in the region is not a viable alternative to the NESE Project.

3.2.2 Transco System Alternatives

During Project design and in response to input from FERC staff and other agencies and stakeholders, Transco utilized hydraulic modeling and considered environmental factors to determine the scope and location of the proposed facilities and to evaluate other configurations of its system that could potentially meet the purpose and need of the NESE Project. We independently reviewed Transco's hydraulic modeling which indicates that expansion of three distinct segments of Transco's system are required to meet the purpose and need of the Project:

- Between Compressor Station 195 (York County, Pennsylvania) and Compressor Station 205 (Mercer County, New Jersey). In this segment, Transco proposes the Quarryville Loop in Lancaster County, Pennsylvania, and increased compression at existing Compressor Station 200 in Chester County, Pennsylvania.

- Between Compressor Station 205 (Mercer County, New Jersey) and the North Market Area (generally between Compressor Station 205 and Compressor Station 207 in Middlesex County, New Jersey). In this segment, Transco proposes new Compressor Station 206 in Somerset County, New Jersey.

- Between Compressor Station 207 (Middlesex County, New Jersey) and the Rockaway Transfer Point (offshore Queens County, New York). In this segment, Transco proposes the Madison Loop in onshore Middlesex County, New Jersey, and the Raritan Bay Loop in offshore New Jersey and New York State waters.

3.2.2.1 System Alternatives Between Compressor Stations 195 and 205

We considered whether increasing compression at existing Compressor Station 195 and/or further increasing compression at Compressor Station 200 beyond that proposed could replace the Quarryville Loop while meeting the contracted delivery volumes of the NESE Project. However, Compressor Station 195 already discharges at the MAOP of the pipeline, which is a safety-based pressure limit determined by PHMSA regulations. Therefore, additional compression would result in pressure within the pipeline downstream of Compressor Station 195 exceeding the MAOP. At Compressor Station 200, increasing compression a sufficient amount to replace the Quarryville Loop, coupled with the incremental capacity of the NESE Project between Compressor Station 195 and Compression Station 200, would result in significant deterioration of delivery pressure at points upstream of Compressor Station 200. For these reasons, we conclude that increasing compression at Compressor Stations 195 and 200 are not feasible alternatives and do not consider them further in our analysis. The potential to increase compression at Compressor Station 205 as an alternative to proposed Compressor Station 206 is discussed in section 3.2.2.2.

3.2.2.2 System Alternatives Between Compressor Station 205 and the North Market Area

We received numerous comments suggesting that Transco's existing system could be modified to eliminate the need for new Compressor Station 206. As discussed below, we considered alternatives that would involve increasing compression at existing Compressor Stations 205 and/or 207; an alternative that would involve replacing Compressor Station 206 with pipeline looping; and an alternative that would involve a combination of increased compression and looping.

Compression Only Alternatives

<u>Compressor Station 205 Only</u>

Hydraulic modeling indicates that adding 45,000 hp of compression at existing Compressor Station 205 would allow the station to discharge at the MAOP of the downstream pipeline system; however, transporting the added capacity of the NESE Project, even discharging at the MAOP, would result in significant deterioration of delivery pressures downstream of Compressor Station 205. Therefore, increasing compression at Compressor Station 205 only is not a viable alternative to Compressor Station

206 and is not considered further. Below we consider the Compressor and Looping Alternative that would include 45,000 hp of additional compression at Compressor Station 205 in combination with pipeline looping to mitigate the pressure loss associated with only adding compression at the station.

Compressor Station 207 Only

Without Compressor Station 206, the added capacity of the NESE Project would result in reduced suction pressure at Compressor Station 207. Adding 25,000 hp of compression at Compressor Station 207 would overcome the reduced suction pressure and allow for existing and new deliveries to be made downstream of Compressor Station 207 on the LNYBL Loop C. However, the added capacity of the Project would also cause significant pressure degradation upstream of Compressor Station 207 on the LNYBL Loop C and on Transco's Mainline downstream of Compressor Station 205 at delivery meters connected to Mainlines A and E, which are not compressed by Compressor Station 207. Compressor Station 207 currently provides compression only on the LNYBL Loop C and the LNYBL downstream of the facility. Therefore, the addition of compression, of any amount, at Compressor Station 207 alone would be insufficient to counteract the pressure degradation upstream of the facility and, thus, is not a viable alternative to Compressor Station 206 and is not considered further.

Compressor Station 205 and Compressor Station 207

Adding compression at both Compressor Station 205 and Compressor Station 207 is not a viable alternative to the construction of Compressor Station 206 because no combination of compression alone at the two compressor stations would be sufficient to meet the hydraulic requirements of the NESE Project. As discussed above, even if horsepower were added at Compressor Station 205 to allow the compressor station to discharge at the MAOP of the downstream pipeline, downstream delivery pressures would be significantly degraded due to the increased pressure drop associated with the incremental Project volumes. The increased pressure drop associated with the incremental Project volumes would occur downstream of Compressor Station 205 on Transco Mainlines A, C and E. Additional horsepower at Compressor Station 207 could be used to mitigate the pressure degradation on the LNYBL Loop C but could not mitigate the increased pressure drop on Mainlines A and E because Compressor Station 207 does not compress Mainlines A and E. Therefore, adding compression at Compressor Station 205 and Compressor Station 207 is not a viable option to Compressor Station 206 and is not considered further in our analysis.

Looping Only Alternative

The Looping Only Alternative requires constructing 15.3 miles of 42-inch-diameter pipeline loop from existing Compressor Station 205 near MP 1773.5 in Mercer County, New Jersey, to MP 1788.2 in Middlesex County, New Jersey (see table 3.2.2-1 and figure 3.2.2-1). The pipeline loop would cross numerous single and multi-family residential developments on the outskirts of Princeton, New Jersey, and 3 miles of nearly contiguous high density residential development in Kendall Park, New Jersey. The Looping Only Alternative also crosses Stony Brook, a sensitive water resource, three times, and the Millstone River and Delaware and Raritan Canal once, within the Delaware and Raritan Canal State Park. Transco indicated that a 1.5-mile-long HDD could potentially be implemented to avoid direct impacts on Stony Brook and nearby residences. We assumed that the HDD would be successful but, based on our previous experience in the Princeton area, the HDD may be technically infeasible, ultimately requiring open trenching across Stony Brook and through additional residential areas.

TABLE 3.2.2-1

Analysis of the Looping Only Alternative Between Compressor Station 205 and the North Market Area

Factor	Looping Only Alternative [a]	Compressor Station 206 [b]
Length of Pipeline Looping (miles)	15.3	0
Construction Right-of-way (acres)	167.3 [c]	29.6
Operational Right-of-way (acres)	41.8 [d]	25.6
Construction Impacts on Forest (acres)	54.9 [e]	17.7
Operational Impacts on Forest (acres)	19.9 [e]	14.3
Construction Impacts on Wetlands (acres)	35.0 [e]	5.5
Operational Impacts on Wetlands (acres)	9.4 [e]	5.5
Stream Crossings (number)	19 [e]	4
Construction Impacts on Local, State, and Federal Lands (acres)	21.8 [e]	0
Operation Impacts on Local, State, and Federal Lands (acres)	5.4 [e]	0
Residences within 50 feet of Construction Right-of-way (number)	112 [e]	0
Road Crossings (number)	38 [e]	0

a Assumes 1.5 miles of loop would be installed by HDD.
b Based on site-specific information.
c Based on an assumed 100-foot-wide nominal right-of-way.
d Based on an assumed 25-foot-wide expansion of existing right-of-way.
e Based on desktop sources.

As indicated in table 3.2.2-1, the Looping Only Alternative impacts about 137.7 acres more land during construction and 16.2 acres more land during operation than Compressor Station 206. In addition, Compressor Station 206 (including the permanent access road) is located on property owned by a single industrial entity, whereas the Looping Only Alternative directly affects hundreds of landowners along the pipeline route. Compared to Compressor Station 206, construction of the Looping Only Alternative impacts 37.2 acres more forest, 29.5 acres more wetland, 21.8 acres more of public land, and 15 more waterbodies. Operation of the looping alternative also results in greater permanent impacts on these resources, including 5.6 acres more forest; 3.9 acres more wetland; and 5.4 acres more of public lands. In addition, the Looping Only Alternative crosses 38 roads and places construction within 50 feet of 112 homes, whereas construction of Compressor Station 206 would not cross any roads and no homes would be within 50 feet of the construction workspace.

As summarized in section 1.3, we received many comments expressing concern about the location and environmental impacts associated with Compressor Station 206. All comments are addressed in this EIS, but the majority of comments centered on proximity of the facility to homes, schools, and places of worship; public safety; public health impacts from air emissions; and operational noise. Whereas adoption of the Looping Only Alternative would eliminate Compressor Station 206, we conclude in section 4.0 that Compressor Station 206 would not result in significant environmental impacts or pose a public safety hazard or health concern if built and operated in accordance with modern engineering practices, applicable environmental and safety regulations, environmental permit conditions, and FERC staff recommendations. We also note that the nearest home and place of worship are about 0.5 mile from the proposed compressor location, and the nearest school is more than 1 mile away (see table 2.1.2-1). Furthermore, in section 3.4.1, we evaluate 39 potential locations for Compressor Station 206 and conclude that none offer a significant environmental advantage when compared to Transco's proposed location.

Based on the above analysis and in balancing impacts between a proposed compressor station and a linear pipeline alternative, we conclude that the Looping Only Alternative does not offer a significant environmental advantage over Transco's proposal and, therefore, do not recommend the alternative.

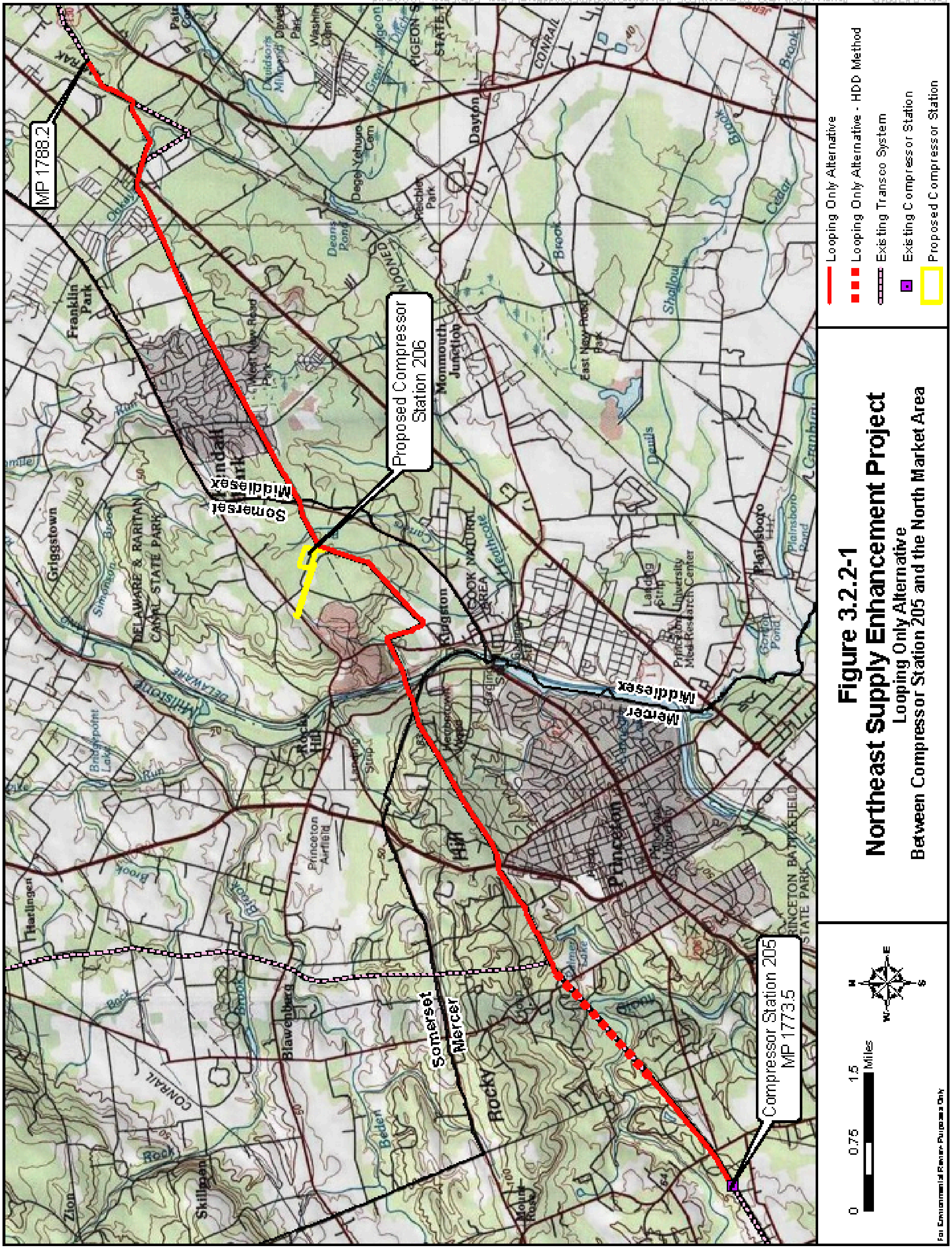


Figure 3.2.2-1
Northeast Supply Enhancement Project
Looping Only Alternative
Between Compressor Station 205 and the North Market Area

Compression and Looping Alternative

The Compression and Looping Alternative combines added compression at Compressor Station 205 with looping downstream of the station to mitigate for the pressure drop associated with transporting the added capacity of the NESE Project that would occur with only adding compression. More specifically, the Compression and Looping Alternative includes an additional 45,000 hp of compression at Compressor Station 205 and 6.8 miles of looping, all of which occurs in Mercer County (see table 3.2.2-2 and figure 3.2.2-2). The pipeline loop crosses numerous single and multi-family residential developments on the outskirts of Princeton, New Jersey, terminating before crossing the Millstone River and Delaware and Raritan Canal. Similar to the discussion above, the pipeline loop crosses Stony Brook, a sensitive water resource, three times. Transco indicated that a 1.5-mile-long HDD could potentially be implemented to avoid direct impacts on Stony Brook and nearby residences. We assumed that the HDD would be successful but, as previously noted, the HDD may be technically infeasible, ultimately requiring open trenching across Stony Brook and through additional residential areas.

TABLE 3.2.2-2

Analysis of the Compression and Looping Alternative Between Compressor Station 205 and the North Market Area

Factor	Compression and Looping Alternative [a]	Compressor Station 206 [b]
Length of Pipeline Looping (miles)	6.8	0
Additional Compression (horsepower)	45,000	32,000
Construction Right-of-way (acres)	89.5 [c]	29.6
Operational Right-of-way (acres)	21.1 [d]	25.6
Construction Impacts on Forest (acres)	33.1 [e]	17.7
Operational Impacts on Forest (acres)	11.6 [e]	14.3
Construction Impacts on Wetlands (acres)	8.3 [e]	5.5
Operational Impacts on Wetlands (acres)	2.1 [e]	5.5
Stream Crossings (number)	4 [e]	4
Construction Impacts on Local, State, and Federal Lands (acres)	23.4 [e]	0
Operation Impacts on Local, State, and Federal Lands (acres)	5.1 [e]	0
Residences within 50 feet of Construction Right-of-way (number)	21 [e]	0
Road Crossings (number)	20 [e]	0

[a] Assumes 1.5 miles of loop would be installed by HDD.
[b] Based on site-specific information.
[c] Based on an assumed 100-foot-wide nominal right-of-way.
[d] Based on an assumed 25-foot-wide expansion of existing right-of-way.
[e] Based on desktop sources.

Compared to Compressor Station 206, the Compression and Looping Alternative requires 13,000 more hp of compression and impacts 59.9 acres more land during construction, including 15.4 acres more forest, 2.8 acres more wetland, and 23.4 acres more public land. During operation, the alternative would impact 2.7 acres less forest and 3.4 acres less wetland than Compressor Station 206, but would permanently affect 5.1 acres more public land. In addition, Compressor Station 206 (including the access road) is located on property owned by a single industrial entity, whereas the looping component of the alternative directly affects hundreds of landowners along the pipeline route. Regarding impacts on area residents, construction of the Compression and Looping Alternative would be within 50 feet of 21 homes and would cross 20 roads, whereas construction of Compressor Station 206 would not cross any roads and no homes would be within 50 feet of the construction workspace.

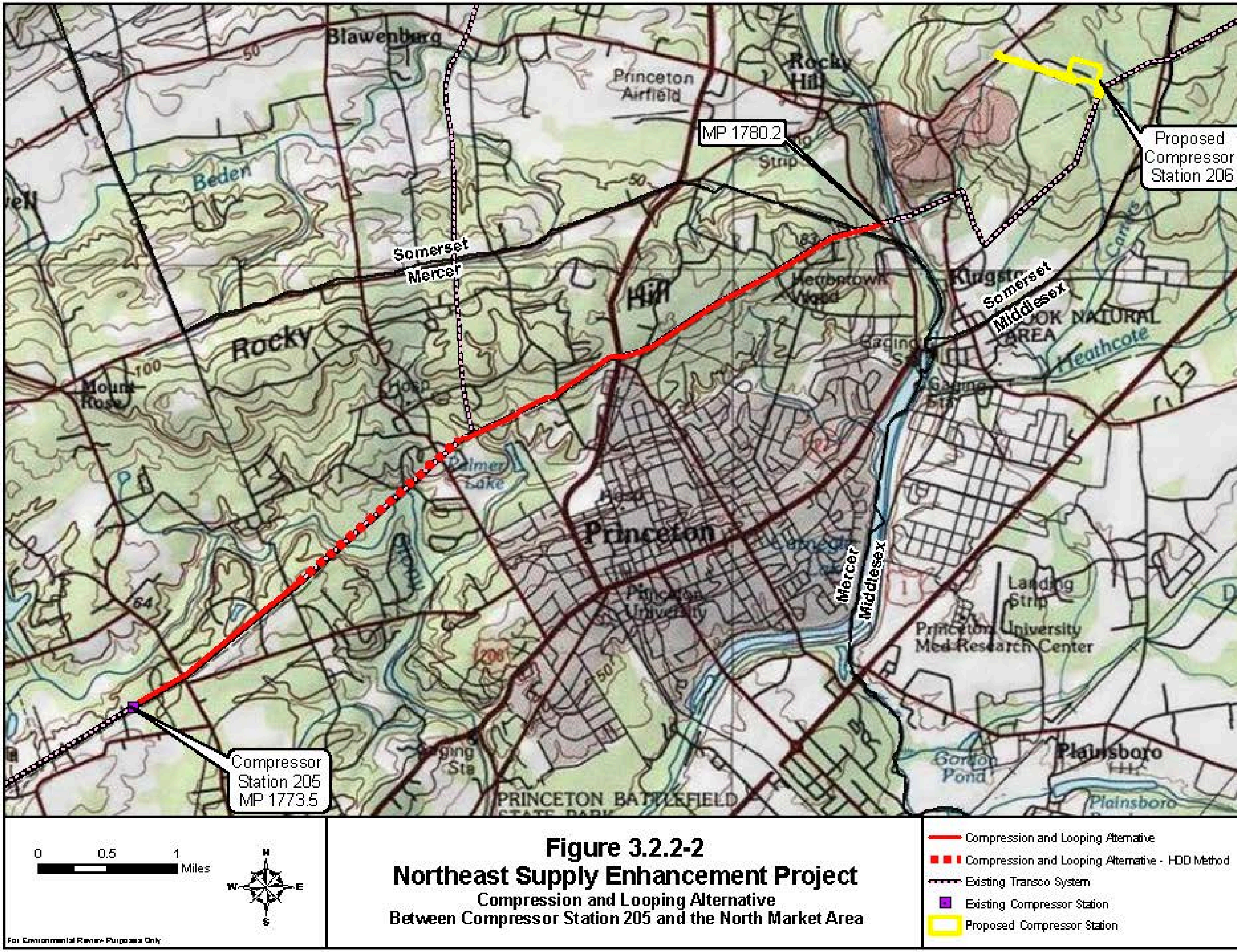


Figure 3.2.2-2
Northeast Supply Enhancement Project
Compression and Looping Alternative
Between Compressor Station 205 and the North Market Area

Although the Compression and Looping Alternative would eliminate the need to construct Compressor Station 206, the alternative would require more compression and would directly impact more residents, land, and resources during construction than would Compressor Station 206. The alternative would have less permanent impact on forest and wetlands, but the impacts of the alternative occur primarily on residential property and public land, whereas the permanent impacts associated with Compressor Station 206 occur on property currently owned by an industrial entity. Also, as previously discussed, we conclude in section 4.0 that Compressor Station 206 would not result in significant environmental impacts or pose a public safety hazard or health concern if built and operated in accordance with modern engineering practices, applicable environmental and safety regulations, environmental permit conditions, and FERC staff recommendations.

Based on the above analysis, we conclude that the Compression and Looping Alternative does not offer a significant environmental advantage over Transco's proposal and, therefore, do not recommend the alternative.

3.2.2.3 System Alternatives Between Compressor Station 207 and the Rockaway Transfer Point

We considered two alternatives for increased compression to replace construction of the Madison Loop and the Raritan Bay Loop, both of which are proposed downstream of existing Compressor Station 207. As previously noted, Compressor Station 207 currently provides compression only on the existing LNYBL Loop C and the existing LNYBL downstream of the facility.

In the first alternative we considered whether additional compression at Compressor Station 207 could deliver the contracted capacity of the NESE Project to the Rockaway Transfer Point via the LNYBL. However, even if sufficient compression was added to allow the station to discharge at the MAOP of the LNYBL, neither the current volumes carried by the LNYBL nor the added capacity of the NESE Project could be delivered due to the increased pressure drop that would be caused by the NESE Project volumes. Therefore, adding compression alone at Compressor Station 207 is not a viable alternative and is not considered further in our analysis.

The contracted capacity of the NESE Project could potentially be met by adding 26,500 hp of compression at Compressor Station 207 and constructing a new, 180,000 hp compressor station in Lower New York Bay, just upstream from the Rockaway Transfer Point. The new compressor station would be located on a large, elevated platform, resulting in conflicts with marine traffic and permanent impacts on marine resources. The offshore compressor station would also generate air emissions, whereas the Madison Loop and Raritan Bay Loop would not, and the facility would be susceptible to damage and service disruption from tropical storms and other extreme marine weather events. For these reasons, we conclude that increasing compression at Compressor Station 207 and constructing a large compressor station in the offshore environment is not a practical alternative to the Madison Loop and Raritan Bay Loop and do not consider it further in our analysis.

3.3 ROUTE ALTERNATIVES

In this section we evaluate route alternatives for the Raritan Bay Loop. Route alternatives represent substantial deviations from a proposed route that may offer a significant environmental advantage compared to the proposed route. Because the Quarryville Loop and Madison Loop would be collocated with Transco's existing Mainline system for 97 percent and 100 percent of their lengths, respectively, we did not consider any route alternatives for the onshore loops as any deviation from the existing right-of-way would lengthen the pipeline, affect new areas and landowners not currently impacted by the existing facilities, and affect more area during construction and operation than would the proposed looping.

Transco consulted with the USACE, NJDEP, NYSDEC, and other agencies in developing the proposed route for the Raritan Bay Loop, and two of the route alternatives we evaluate below were requested by the NMFS (Alternative 5) and the NYSDEC (Alternative 6). The primary assumptions that we considered in our review of the Raritan Bay Loop route alternatives were:

- The Raritan Bay Loop must originate at the termination of the Madison Loop located onshore in Middlesex County, New Jersey and must terminate at the Rockaway Transfer Point located about 2.75 miles offshore of Rockaway, New York. However, the route of some alternatives would be the same as Transco's proposed route over certain segments, particularly near the beginning and end of the routes. For instance, the end of each route would require similar activities related to the tie-in to the Rockaway Transfer Point. In these common areas the environmental impacts would be identical and, therefore, not a decisive factor in our analysis. Therefore, we focused our comparative analysis on only those areas where Transco's proposed route and the alternative would deviate from each other.

- Each alternative must be constructed to meet the USACE marine navigational safety and pipeline burial depth requirements (see sections 2.3.3.4 and 3.6). In general, we assumed that a clamshell dredger and pre-lay construction method would be used to install the pipeline in shallow water (less than 15 feet deep), to cross smaller maintained channels such as the Raritan Bay and Chapel Hill Channels, and to cross designated anchorage areas. We assumed a burial depth with 15 feet of cover to cross smaller federally maintained channels and a burial depth with 7 feet of cover to cross designated anchorage areas as required by the USACE. For other trench segments we assumed that the pipeline would be installed using the jet trencher. Excavation using a clamshell dredger results in greater turbidity and sedimentation, requires more backfill, and takes about twice the time per unit length as using a jet trencher. We assumed that major navigational channels such as the Ambrose Channel would be crossed using the HDD method.

- We estimated the amount of sediment that would be excavated for each alternative based on Transco's detailed sedimentation estimates for the trenching methods associated with the proposed route and the lengths that each trenching method would be used for each alternative. We did not include excavations associated with crossing the Neptune cable as these excavations represent a small percentage of the total excavation for the Raritan Bay Loop. For HDD crossings we assumed the same average volume of sediment would be excavated at each HDD entry and exit location as estimated by Transco.

- Transco may be able to utilize some side cast spoil as backfill but, based on Transco's detailed estimates for the proposed route, we estimated the volume of supplemental backfill needed to bury the Raritan Bay Loop and cover HDD entry and exit pits to be 75 percent of the excavated volume.

Alternative 1

Alternative 1 deviates from the proposed route at MP 12.9 in Raritan Bay, and continues collocated with Transco's existing LNYBL along its entire length. This alternative also closely parallels the Neptune Cable for the majority of its length. Figure 3.3-1 depicts Alternative 1 and Transco's proposed route, and table 3.3-1 compares the environmental impacts associated with Alternative 1 and the proposed route where they deviate.

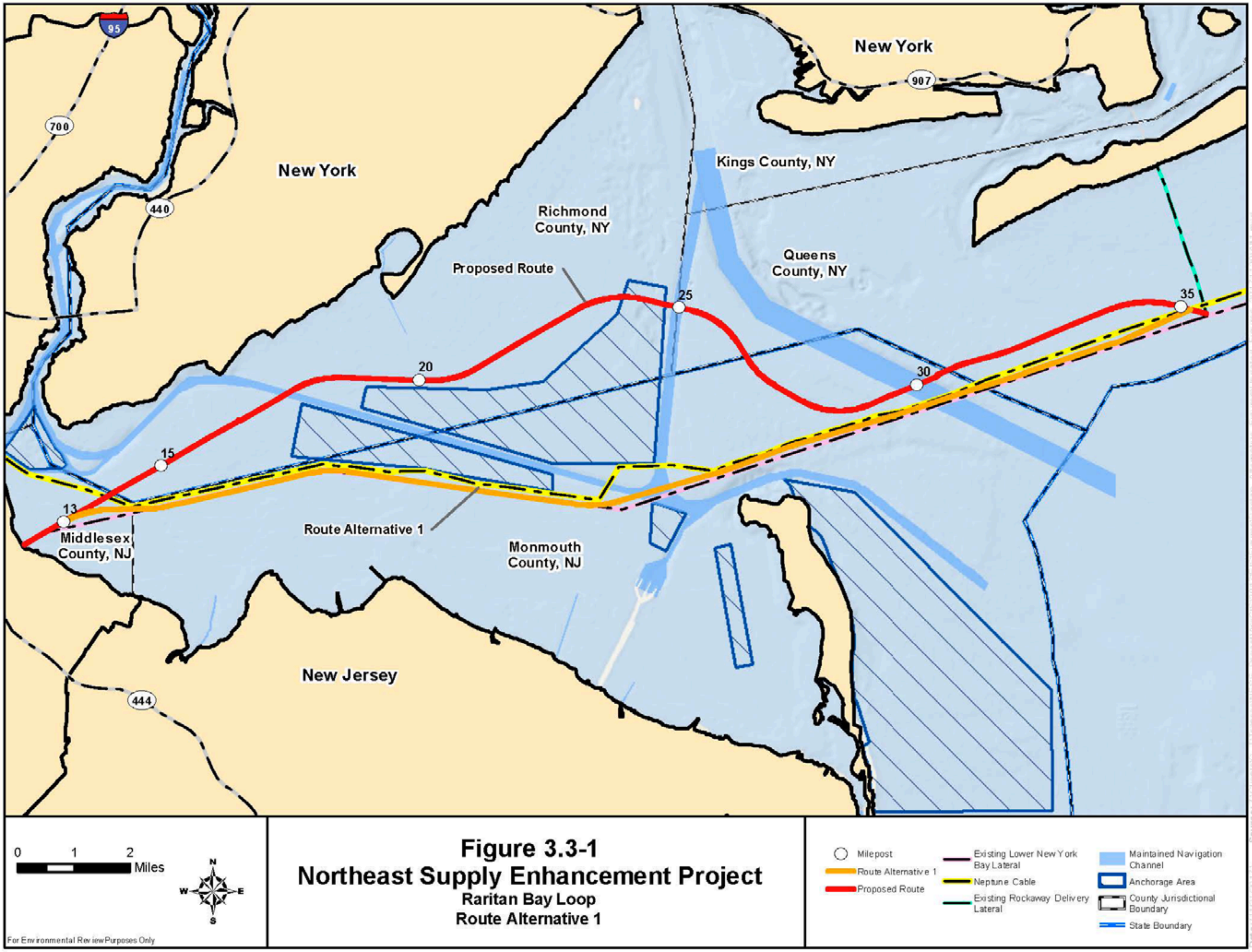


Figure 3.3-1
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 1

TABLE 3.3-1

Comparison of Alternative 1 to the Proposed Route (MPs 12.9 to 35.2)

Factor	Alternative 1		Proposed Route	
	NJ	NY	NJ	NY
Total Length (miles)	20.8		22.3	
Length by State (miles)	17.0	3.9	5.2	17.1
Navigation Channels Crossed (no.)	3	0	1	2
Anchorage Area Crossed (miles)	0	0	0	0.8
HDDs (no.)	2	0	1	0
Sediment Disturbed by HDD Pits (cubic yards)	116,252	0	58,126	0
Trenching Impacts				
Clamshell Dredger Length (miles)	3.3	0	1.1	5.2
Jet Trencher Length (miles)	10.5	3.9	3.2	11.9
Sediment Disturbed by Trenching (cubic yards)	473,914	67,683	149,785	916,465
Sediment Disturbed by Trenching and HDD (cubic yards)	657,849		1,124,376	
Supplemental Backfill (cubic yards)	493,387		843,282	
Wrecks within 0.5 mile of Pipeline (no.) [a]	3	0	1	2
Cultural Resources within 1 mile of Pipeline (no.)	1	0	1	2
AWOIS and ENC Offshore Obstructions within 0.5 mile of Pipeline [a]	4	1	2	3
NJDEP Hard Clam Relative Abundance (miles)				
Low (miles)	1.6	-	0	-
Medium (miles)	0.2	-	0	-
High (miles)	11.3	-	1.9	-
NJDEP Surf Clam Relative Abundance (miles)	2.6	-	0	-
NYSDEC Certified Shellfish Area (miles)	-	0.7	-	0.8
NYSDEC Uncertified Shellfish Area (miles)	-	3.3	-	16.6

[a] Obstructions were taken from the AWOIS database.
AWOIS = Automated Wreck and Obstruction Information System.
ENC = Electronic Navigation Chart

Alternative 1 is about 1.5 miles shorter than the proposed route, would avoid designated anchorage areas (which require deeper excavation and burial), and would require about 3.0 miles less clamshell trenching. As discussed below, Alternative 1 would require an additional HDD resulting in excavation of two times the volume of sediment as the single HDD for the proposed route. However, due to the reduced overall length and use of the clamshell dredger for trench excavation, including deep burial of the proposed route at the Chapel Hill and Raritan Bay Channels, Alternative 1 would disturb about 466,527 fewer cubic yards of sediment during excavation and require about 349,895 fewer cubic yards of supplemental backfill material. Due to routing differences, Alternative 1 would cross 13.4 fewer miles of certified and uncertified shellfish area in New York waters, but 13.8 more miles of hard clam and surf clam habitat in New Jersey waters.

One of the concerns associated with Alternative 1 is its proximity to both the existing LNYBL and the Neptune Cable, which pose safety and reliability issues if either of these critical facilities were damaged during construction. As noted above, Alternative 1 and the proposed route each cross the Ambrose Channel using the HDD method, resulting in similar impacts; however, Alternative 1 also uses the HDD method to cross the intersection of the Raritan Bay Channel, Chapel Hill Channel, and Sandy Hook Channel. The three-channel HDD crossing would require additional time for in-water construction, increasing the potential for an inadvertent release of drilling fluid to the environment. The three-channel HDD staging area would also be subject to more dynamic sea currents north of Sandy Hook, which could increase safety risks and cause constructability issues. In addition, the Sandy Hook Channel is actively eroding northwards, which could result in maintenance and reliability concerns for the new pipeline in the future.

In summary, the primary advantage of Alternative 1 is that it would disturb less sediment during excavation and backfilling than Transco's proposed route. However, as discussed in sections 4.3.3.3 and 4.5.2.8, the impact of sedimentation on water quality and aquatic species would be generally localized, temporary, and minor to moderate. We conclude that Alternative 1 does not provide a significant environmental advantage over the proposed route, and that any advantages would be outweighed by the safety, constructability, and reliability concerns associated with the alternative. For these reasons, we do not recommend adoption of Alternative 1.

Alternative 2

Alternative 2 deviates from the proposed route at MP 13.9, and continues generally east, crossing the Raritan Bay Channel, then the Chapel Hill Channel north of the intersection of the Raritan Bay, Chapel Hill, and Sandy Hook Channels. The route then continues east and rejoins the proposed route at approximate MP 29.1. We considered Alternative 2 to avoid the safety, constructability, and reliability concerns associated with collocating with Transco's existing LNYBL and the Neptune Cable in Alternative 1, above. Figure 3.3-2 depicts Alternative 2 and Transco's proposed route, and table 3.3-2 compares Alternative 2 and the proposed route.

TABLE 3.3-2

Comparison of Alternative 2 to the Proposed Route (MPs 13.9 to 29.1)

	Alternative 2		Proposed Route	
Factor	NJ	NY	NJ	NY
Total Length (miles)	13.8		15.2	
Length by State (miles)	10.4	3.4	2.7	12.5
Navigation Channels Crossed (no.)	2	0	0	2
Anchorage Areas Crossed (miles)	5.7	0	0	0.8
HDDs (no.)	0		0	
Trenching Impacts				
Clamshell Dredger Length (miles)	6.3	2.3	0	4.7
Jet Trencher Length (miles)	4.1	1.1	2.7	7.7
Sediment Disturbed by Trenching (cubic yards)	617,458	533,582	46,998	833,817
Sediments Subtotal (cubic yards)	1,150,040		880,815	
Supplemental Backfill (cubic yards)	862,530		660,611	
Wrecks within 0.5 mile of Pipeline (no.) [a]	3	1	1	2
Cultural Resources within 1 mile of Pipeline (no.)	0	1	1	2
AWOIS and ENC Offshore Obstructions within 0.5 mile of Pipeline [a]	2	1	2	3
NJDEP Hard Clam Relative Abundance (miles)				
Low (miles)	0	-	0	-
Medium (miles)	2.2	-	0	-
High (miles)	7.3	-	1.9	-
NJDEP Surf Clam Relative Abundance (miles)	2.6	-	0	-
NYSDEC Certified Shellfish Area (miles)	-	0	-	0
NYSDEC Uncertified Shellfish Area (miles)	-	3.4	-	12.6

[a] Obstructions were taken from the AWOIS database.
AWOIS = Automated Wreck and Obstruction Information System.
ENC = Electronic Navigation Chart

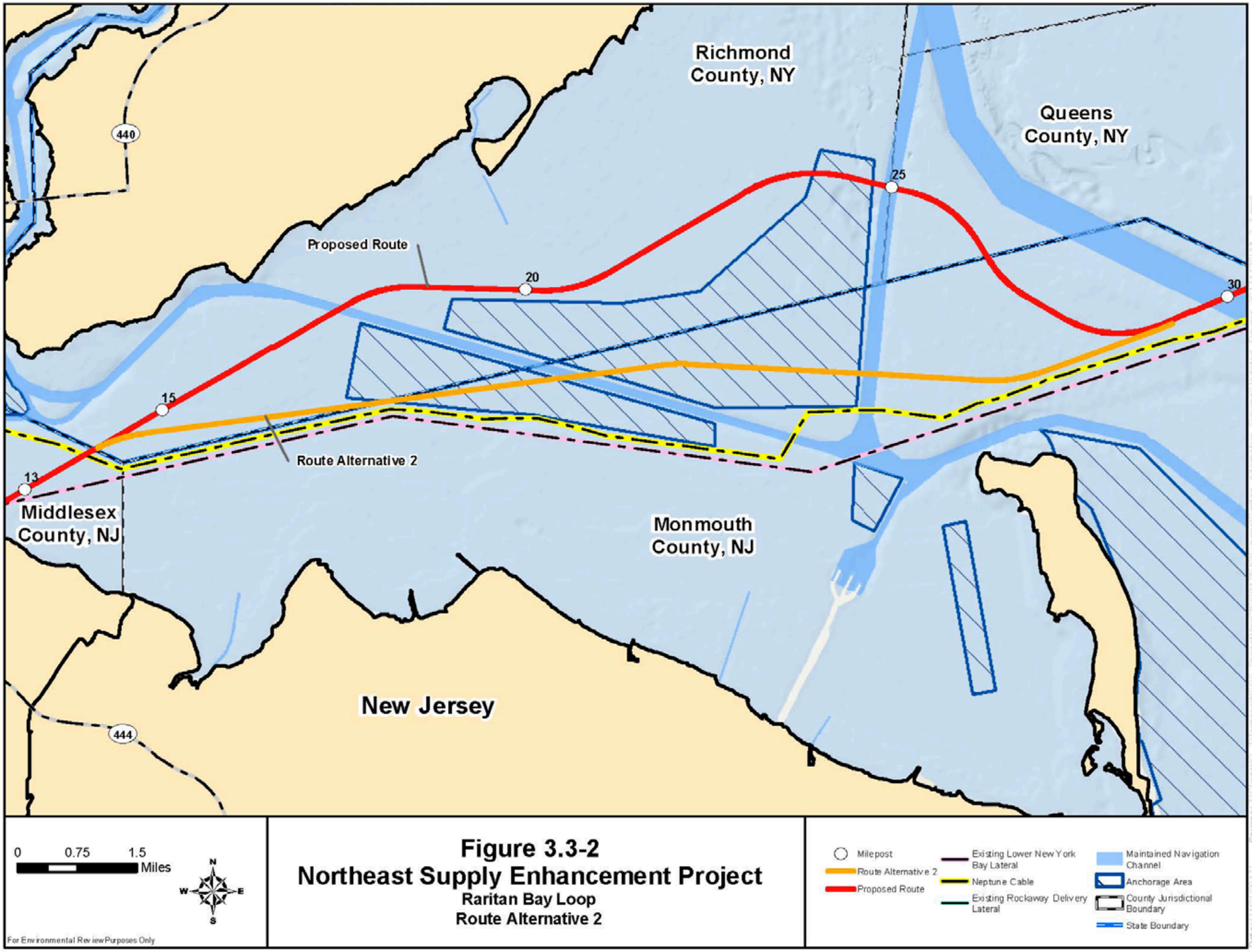


Figure 3.3-2
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 2

Alternative 2 is about 1.4 miles shorter than the corresponding segment of the proposed route. However, the alternative would require use of the clamshell dredger for about 3.9 miles more of trenching, including across 4.9 miles more of designated anchorage area, where deeper excavation and pipeline burial would be required. Alternative 2 and the proposed route would each require deep burial using a clamshell dredge to cross the Raritan Bay and Chapel Hill Channels. As such, the alternative would disturb an additional 269,225 cubic yards of sediment during excavation and require an additional 201,919 cubic yards of supplemental backfill material than the proposed route. Although it is shorter, Alternative 2 would take longer to construct due to the additional trenching by clamshell dredge, and could impact commercial shipping due to the extended work in designated anchorage areas. Due to routing differences, Alternative 2 would cross 9.2 fewer miles of certified and uncertified shellfish area in New York waters, but 10.2 more miles of hard clam and surf clam habitat in New Jersey waters.

Based on the above analysis, we conclude that Alternative 2 would not result in a significant environmental advantage over the proposed route; therefore, we do not recommend the alternative.

Alternative 3

Alternative 3 is located entirely in New York State waters, and deviates from the proposed route at approximate MP 18.8 and continues generally east to the Rockaway Transfer Point. We considered Alternative 3 to potentially reduce the length of the Raritan Bay Loop. Figure 3.3-3 depicts Alternative 3 and Transco's proposed route, and table 3.3-3 compares the environmental impacts of the alternative and proposed route.

TABLE 3.3-3

Comparison of Alternative 3 to the Proposed Route (MPs 18.8 to 35.2)

	Alternative 3		Proposed Route	
Factor	NJ	NY	NJ	NY
Total Length (miles)	15.6		16.4	
Length by State (miles)	0	15.6	4.1	12.3
Navigation Channels Crossed (no.)	0	2	1	1
Anchorage Area Crossed (miles)	0	0.8	0	0.8
HDDs (no.)	1	0	1	0
Sediment Disturbed by HDD Pits (cubic yards)	58,126	0	58,126	0
Trenching Impacts				
Clamshell Dredger Length (miles)	0	2.0	0	2.0
Jet Trencher Length (miles)	0	12.8	3.2	10.3
Sediment Disturbed by Trenching (cubic yards)	0	500,052	56,336	454,252
Sediment Disturbed by Trenching and HDD (cubic yards)	558,178		568,714	
Supplemental Backfill (cubic yards)	418,633		426,535	
Wrecks within 0.5 mile of Pipeline (no.) [a]	0	5	1	2
Cultural Resources within 1 mile of Pipeline (no.)	0	2	1	2
AWOIS and ENC Offshore Obstructions within 0.5 mile of Pipeline [a]	0	13	2	3
NJDEP Hard Clam Relative Abundance (miles)				
Low (miles)	0	-	0	-
Medium (miles)	0	-	0	-
High (miles)	0	-	1.9	-
NJDEP Surf Clam Relative Abundance (miles)	0	-	0	-
NYSDEC Certified Shellfish Area (miles)	-	1.1	-	0.8
NYSDEC Uncertified Shellfish Area (miles)	-	14.1	-	11.5

[a] Obstructions were taken from the AWOIS database.

AWOIS = Automated Wreck and Obstruction Information System.

ENC = Electronic Navigation Chart

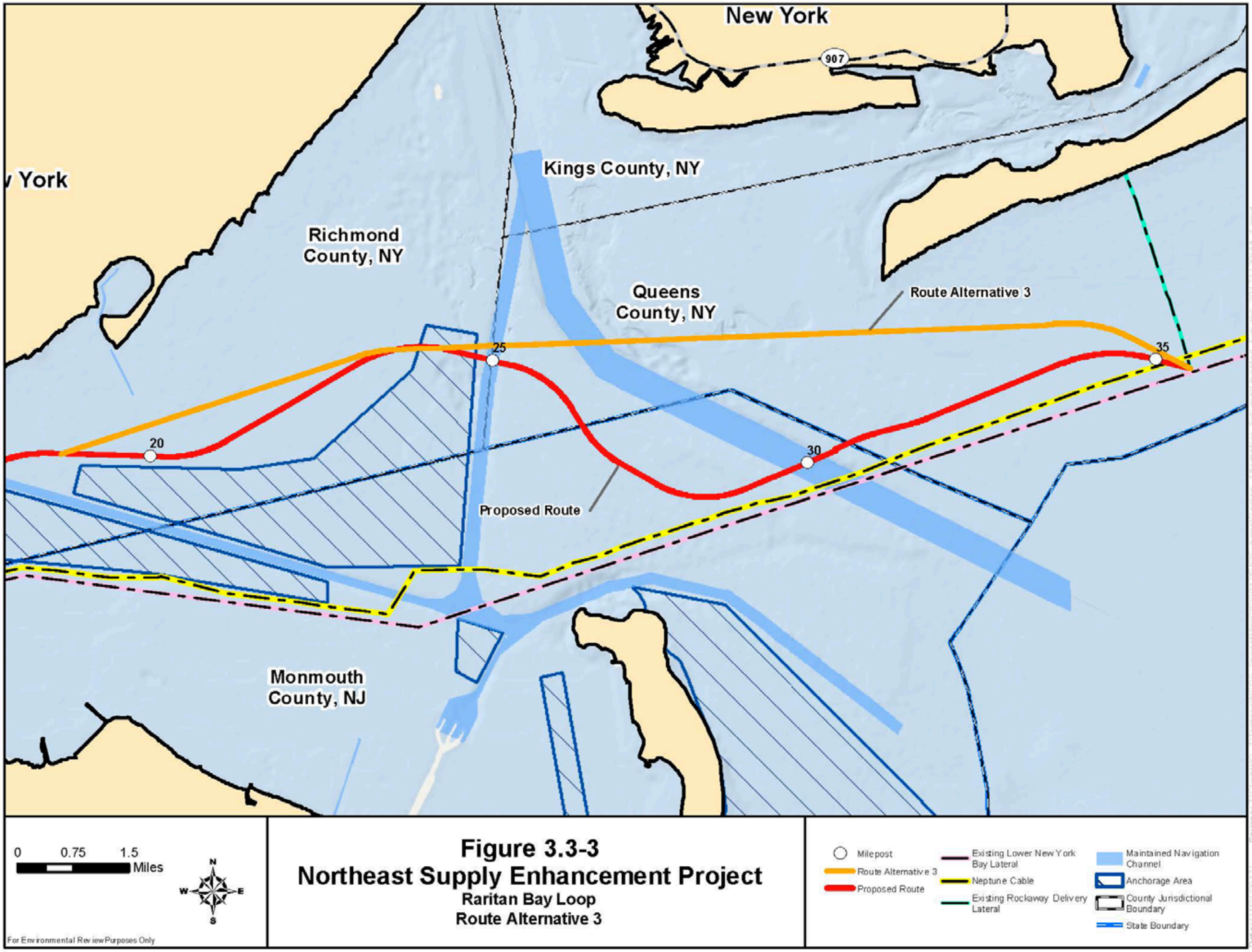


Figure 3.3-3
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 3

Alternative 3 is about 0.8 mile shorter than the proposed route. Both routes would cross the same length of designated anchorage areas, require the same length of excavation using the clamshell dredger, and require an HDD crossing of the Ambrose Channel. Both routes would also require deep burial using a clamshell dredge to cross the Chapel Hill Channel. Due to overall similarities in construction, Alternative 3 would result in only slightly less sediment disturbance and backfill requirements than the proposed route. The alternative would not impact hard clam and surf clam habitat in New Jersey, but would cross an additional 2.9 miles of certified and uncertified shellfish habitat in New York waters.

The primary concern regarding Alternative 3 involves the HDD crossing of the Ambrose Channel and other potential construction obstacles further to the east. As depicted on figure 3.3-3, sediment borrow areas are located along the east side of the Ambrose Channel at the alternative HDD crossing. To avoid conflicts with future use of the borrow areas and due to seafloor stability concerns associated with the borrow areas, the Alternative 3 HDD entry point would have to be set back further from the Ambrose Channel, approximately doubling the length of the HDD relative to the proposed route. Depending on the final design of the HDD, there may be insufficient laydown area for the HDD pullback segment on the west side of the Ambrose Channel due to proximity to the Chapel Hill Channel. Regardless of design, the alternative HDD crossing would take about twice as long to complete as would the HDD at the proposed crossing, increasing the potential for an inadvertent release of drilling fluid to the environment or potential failure of the HDD crossing method. Transco also identified greater seafloor variability and a higher density of rocky material along the alternative route to the east of the Ambrose Channel as compared to the proposed route, which could cause pipeline support and integrity issues, prevent sufficient burial, and damage pipeline coatings. In addition, Alternative 3 would place construction in closer proximity to the Jamaica Bay Wildlife Refuge and Jamaica Bay Important Bird Area (IBA), which commenters on the draft EIS raised as a potential concern for Transco’s proposed route.

Based on the above analysis, we conclude that Alternative 3 would not result in a significant environmental advantage over the proposed route, and that the alternative would pose substantial constructability concerns. Therefore, we do not recommend that Alternative 3 be adopted.

Alternative 4

Alternative 4 is located entirely in New York state waters, and deviates from the proposed route at approximate MP 19.0 and extends northeast, crossing the Ambrose Channel north of the intersection of the Ambrose Channel and the Chapel Hill Channel, then continues east and south before rejoining the proposed route at approximate MP 31.9. We considered Alternative 4 to entirely avoid designated anchorage areas and eliminate a crossing of the Chapel Hill Channel. Figure 3.3-4 depicts Alternative 4 and Transco’s proposed route, and table 3.3-4 compares the alternative and the proposed route.

When compared to the proposed route, the primary advantages of Alternative 4 are that it would avoid construction in designated anchorage areas and would not require use of a clamshell dredge for trench excavation (a clamshell would be needed to excavate and backfill HDD entry and exit pits). Due to these construction differences, Alternative 4 would disturb 201,677 cubic yards less sediment and require 151,257 cubic yards less backfill material than the corresponding segment of the proposed route, despite being 1.9 miles longer than the proposed route. The alternative would not impact hard clam and surf clam habitat in New Jersey, but would cross an additional 2.9 miles of certified and uncertified shellfish habitat in New York waters.

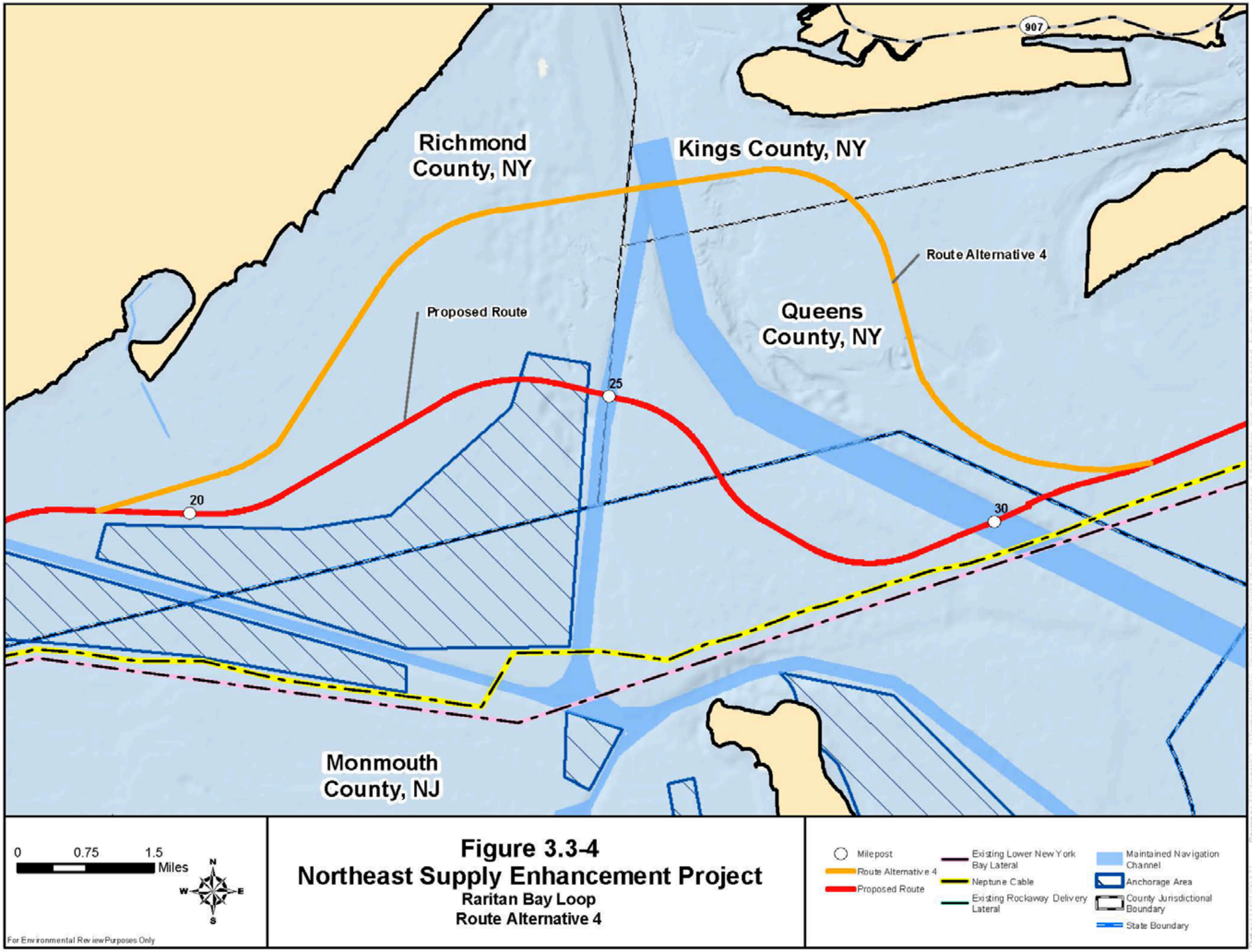


Figure 3.3-4
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 4

TABLE 3.3-4

Comparison of Alternative 4 to the Proposed Route (MPs 19.0 to 31.9)

	Alternative 4		Proposed Route	
Factor	NJ	NY	NJ	NY
Total Length (miles)	14.8		12.9	
Length by State (miles)	0	14.8	4.1	8.7
Navigation Channels Crossed (no.)	0	1	1	1
Anchorage Area Crossed (miles)	0	0	0	0.8
HDDs (no.)	0	1	1	0
Sediment Disturbed by HDD Pits (cubic yards)	0	58,126	58,126	0
Trenching Impacts				
Clamshell Dredger Length (miles)	0	0	0	1.6
Jet Trencher Length (miles)	0	14.2	3.2	7.1
Sediment Disturbed by Trenching (cubic yards)	0	247,686	56,336	393,027
Sediment Disturbed by Trenching and HDD (cubic yards	305,812		507,489	
Supplemental Backfill (cubic yards)	229,359		380,616	
Wrecks within 0.5 mile of Pipeline (no.) [a]	0	4	1	2
Cultural Resources within 1 mile of Pipeline (no.)	0	1	1	2
AWOIS and ENC Offshore Obstructions within 0.5 mile of Pipeline [a]	0	11	2	3
NJDEP Hard Clam Relative Abundance (miles)				
Low (miles)	0	-	0	-
Medium (miles)	0	-	0	-
High (miles)	0	-	1.9	-
NJDEP Surf Clam Relative Abundance (miles)	0	-	0	-
NYSDEC Certified Shellfish Area (miles)	-	0	-	0
NYSDEC Uncertified Shellfish Area (miles)	-	14.8	-	8.3

[a] Obstructions were taken from the AWOIS database.
AWOIS = Automated Wreck and Obstruction Information System.
ENC = Electronic Navigation Chart

The concerns with Alternative 4 are similar to the concerns with Alternative 3 and relate to the constructability of the HDD crossing of the Ambrose Channel and other potential obstacles further to the east. As depicted on figure 3.3-4, sediment borrow areas are located along both sides of the Ambrose Channel at the Alternative 4 HDD crossing. To avoid conflicts with future use of the borrow areas and due to seafloor stability concerns, the Alternative 4 HDD entry and exit points would have to be set back further from the Ambrose Channel, approximately doubling the length of the HDD relative to the proposed route. The alternative HDD crossing would take about twice as long to complete as would the HDD at the proposed crossing, increasing the potential for an inadvertent release of drilling fluid to the environment or potential failure of the HDD crossing method. Transco also identified greater seafloor variability and a higher density of rocky material along the alternative route to the east of the Ambrose Channel as compared to the proposed route, where the proposed use of the jet trencher (which minimizes sedimentation and backfill) could be unsuccessful. Because of its closer proximity to the Narrows, construction of the alternative would also likely result in greater conflicts with marine vessel traffic as compared to the proposed route, and increased currents near the Narrows could pose greater construction risk. In addition, Alternative 4 would place more construction in closer proximity to the Jamaica Bay Wildlife Refuge and Jamaica Bay IBA, which commenters on the draft EIS raised as a potential concern for Transco's proposed route.

Based on the above analysis, we conclude that Alternative 4 would not result in a significant environmental advantage over the proposed route, and that the alternative would pose substantial constructability concerns as well as increased conflict with heavy marine traffic. Therefore, we do not recommend that Alternative 4 be adopted.

Alternative 5

As noted above, Alternative 5 was developed to address a request from the NMFS to reduce the length of offshore pipeline associated with the Raritan Bay Loop. Alternative 5 begins onshore at the termination of the Madison Loop at MP 12.0. The proposed route proceeds offshore with the Morgan Shore Approach HDD, exiting in Raritan Bay, whereas Alternative 5 continues onshore toward the southeast, following State Highway 35 and then State Highway 36 for 17.0 miles before crossing beneath the New Jersey shoreline and the Gateway National Recreation Area at Plum Island with a similar shore-to-water HDD. At the shore-to-water HDD exit point, Alternative 5 then traverses northeasterly through open water of the Atlantic Ocean to the Rockaway Transfer Point. Both routes would require an HDD to cross the Ambrose Channel and Alternative 5 would have to cross beneath Transco's existing LNYBL to reach the Rockaway Transfer Point. Figure 3.3-5 depicts Alternative 5 and Transco's proposed route, and table 3.3-5 compares the alternative and proposed route.

TABLE 3.3-5

Comparison of Alternative 5 to the Proposed Route (MPs 12.0 to 35.2)

	Alternative 5		Proposed Route	
Factor	NJ	NY	NJ	NY
Total Length (miles)	30.2		23.2	
Length by State (miles)	26.9	3.4	6.2	17.0
Onshore Length (miles)	17.0	0	0.2	0
Offshore Length (miles)	9.9	3.4	6.1	17.0
Navigation Channels Crossed (no.)	1	0	1	2
Anchorage Areas Crossed (miles)	3.8	0	0	0.8
HDDs (no.)	2	0	2	0
Sediment Disturbed by HDD Pits (cubic yards) [a]	174,378	0	174,378	0
Trenching Impacts				
Clamshell Dredger Length (miles)	3.8	0	1.5	5.2
Jet Trencher Length (miles)	4.6	3.4	3.2	11.9
Sediment Disturbed by Trenching (cubic yards)	413,501	58,347	188,805	916,291
Sediment Disturbed by Trenching and HDD (cubic yards)	646,226		1,279,474	
Supplemental Backfill (cubic yards)	484,669		959,605	
Wrecks within 0.5 mile of Pipeline (no.) [b]	5	1	1	2
Cultural Resources within 1 mile of Pipeline (no.)	21	1	1	2
AWOIS and ENC Offshore Obstructions within 0.5 mile of Pipeline [a]	5	1	2	3
NJDEP Hard Clam Relative Abundance (miles)				
Low (miles)	0	-	0	-
Medium (miles)	0.2	-	0	-
High (miles)	0	-	1.9	-
NJDEP Surf Clam Relative Abundance (miles)	0	-	0	-
NYSDEC Certified Shellfish Area (miles)	-	0.7	-	0.8
NYSDEC Uncertified Shellfish Area (miles)	-	2.6	-	16.3
NJ and NY Sport Fishing Areas (miles)	7.0	0.4	1.0	0.8
Onshore Waterbody Crossings (no.)	10		0	
Road Crossings (no.)	172		3	
Residences within 250 feet of Construction (no.)	937		6	

[a] Alternative 5 and the proposed route would both include a shore-to-water HDD and a water-to-water HDD, requiring three offshore HDD entry/exit pits.
[b] Obstructions were taken from the AWOIS database.
AWOIS = Automated Wreck and Obstruction Information System.
ENC = Electronic Navigation Chart

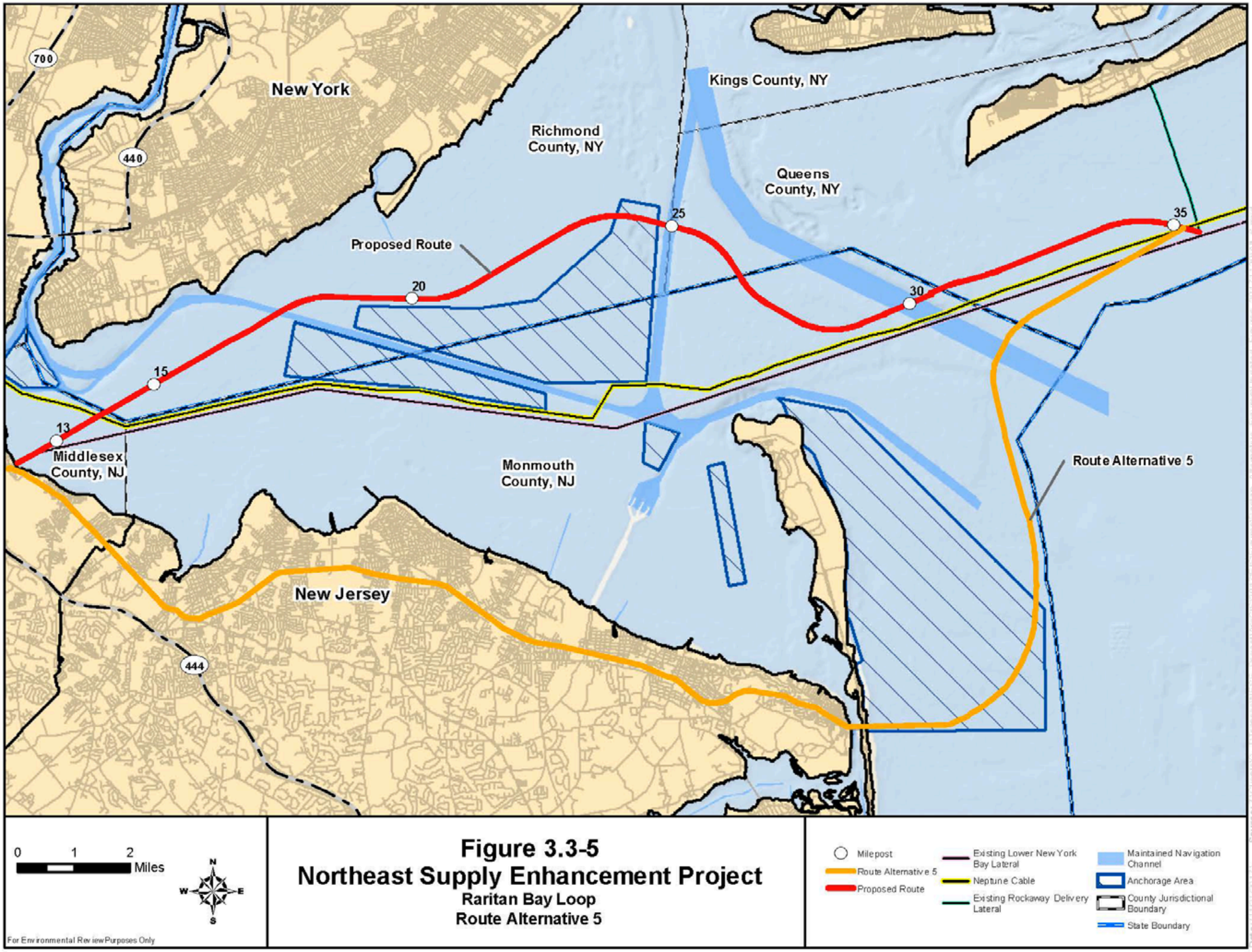


Figure 3.3-5
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 5

Alternative 5 would reduce the length of offshore pipeline by about 9.7 miles, reducing sediment impacts by 633,248 cubic yards and backfill requirements by 474,936 cubic yards as compared to the proposed route, although this difference would be substantially reduced if the USACE would require deep burial of Alternative 5 across the designated anchorage area off of the Sandy Hook peninsula. The alternative would also cross 13.8 fewer miles of certified and uncertified shellfish area in New York waters and 1.7 fewer miles of hard clam and surf clam habitat in New Jersey waters. Therefore, Alternative 5 would have less impact on aquatic organisms although, as discussed in sections 4.3.3.3 and 4.5.2.8, we conclude that construction of the Raritan Bay Loop as proposed would have generally localized, temporary, and minor to moderate impacts on water quality and marine species.

Overall, Alternative 5 would be 7 miles longer than the proposed route and would include 17 miles of onshore construction (via overland methods) as compared to 0.2 mile of onshore construction (via HDD) for the proposed route. The entire area between the termination of the Madison Loop and Plum Island is heavily developed. Thus, Alternative 5 would have significantly greater impact on residents and businesses than the proposed route. Impacts on residents and businesses would be reduced by attempting to follow Highways 35 and 36; however, approximately 931 more homes and hundreds of more places of business would be within 250 feet of construction for the alternative. Alternative 5 would also cross 172 roads which would be highly disruptive to traffic, whereas the proposed route would cross 3 roads via HDD, avoiding any traffic issues. Alternative 5 would also result in substantially greater impacts on onshore environmental resources than would the proposed route. More specifically, Alternative 5 would be within 1 mile of 19 more cultural resources than the proposed route, and would cross at least 10 waterbodies, some of which include substantial wetland complexes such as at Cheesequake Creek, Matawan Point, and Natco Lake. Special construction methods could be used to reduce wetland and waterbody impacts, but not all impacts could be avoided. Finally, Alternative 5 would result in a 50-foot-wide permanent easement along the entire 17-mile-long onshore segment of the route, permanently affecting future land use along the route.

In summary, Alternative 5 would reduce the length of pipeline construction in the offshore environment which would, in turn, reduce impacts on aquatic resources. However, based on our analysis above, we conclude that the environmental benefits gained in the offshore environment would be far outweighed by the adverse impacts on the human and natural onshore environment that would be associated with Alternative 5. For these reasons we do not recommend Alternative 5. We also note that, in its comments on the draft EIS, the National Park Service (NPS) concurred that Alternative 5 should not be recommended because it would cross the Gateway National Recreation area whereas Transco's proposed route and several other alternatives would be unlikely to impact this area and its resources.

Alternative 6

We considered Alternative 6 due to NYSDEC concerns regarding the potential for the proposed route to impact areas with a high abundance and density of hard clams. The alternative deviates from the proposed route at approximately MP 14.4 and rejoins the proposed route at approximately MP 21.6. Figure 3.3-6 depicts Alternative 6 and Transco's proposed route, and table 3.3-6 compares the alternative and proposed route.

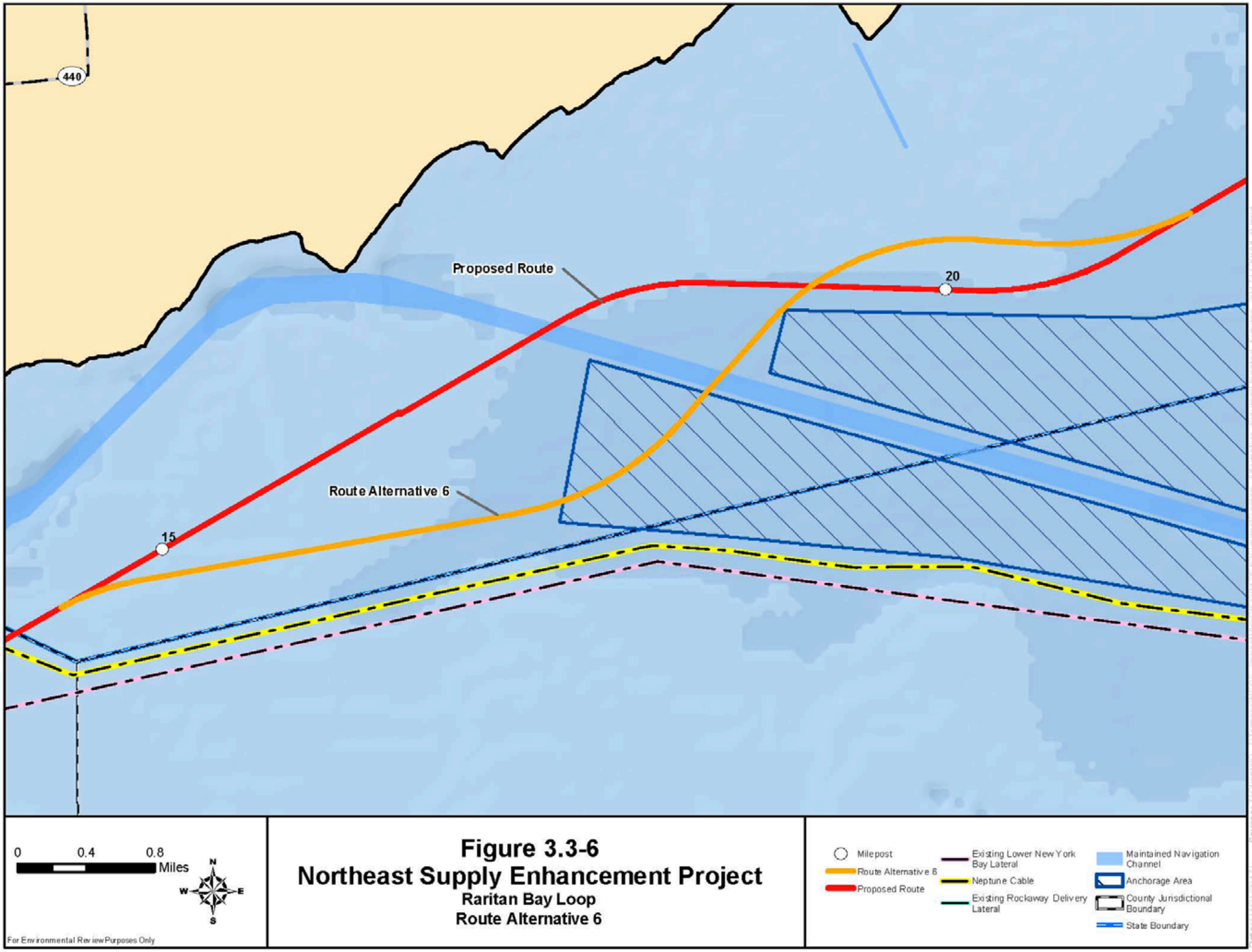


Figure 3.3-6
Northeast Supply Enhancement Project
Raritan Bay Loop
Route Alternative 6

TABLE 3.3-6

Comparison of Alternative 6 to the Proposed Route (MPs 14.4 to 21.6)

Factor	Alternative 6	Proposed Route
Total Length (miles)	7.3	7.2
Navigation Channels Crossed (no.)	1	1
Anchorage Area Crossed (miles)	1.1	0
Trenching Impacts		
Clamshell Dredger Length (miles)	3.4	2.9
Jet Trencher Length (miles)	3.9	4.3
Sediment Disturbed by Trenching (cubic yards)	518,388	483,957
Supplemental Backfill (cubic yards)	388,791	362,967
NYSDEC Certified Shellfish Area (miles)	0	0
NYSDEC Uncertified Shellfish Area (miles)	7.3	7.2

AWOIS = Automated Wreck and Obstruction Information System.
ENC = Electronic Navigation Chart

Alternative 6 is about 0.1 mile longer than the corresponding segment of the proposed route. The alternative would also cross 1.1 miles of designated anchorage area, whereas the proposed route avoids anchorage areas. Due to its added length and greater burial depth requirements, Alternative 6 would disturb an additional 34,431 cubic yards of sediment and require an additional 25,824 cubic yards of backfill material then would the proposed route. The proposed route minimizes the crossing length within an area identified by the NYSDEC to be the most productive hard clam area for Raritan Bay in New York waters based on qualitative data, including historic reports from clam harvesters. The area is currently designated as uncertified (i.e., closed for harvesting), but it was previously commercially harvested under special permit as part of the NYSDEC transplantation program, yielding about half of all New York State hard clam landings. No hard clam harvesting has occurred in this area since 2013, though NYSDEC has indicated that it may reinitiate the transplantation program in the future if economically feasible. Transco completed a benthic grab survey to quantify the hard clam density along the proposed route and Alternative 6. Within the NYSDEC hard clam transplantation area, the survey results show no statistical difference in hard clam density between the two routes.

Based on the above analysis, we conclude that Alternative 6 would not result in a significant environmental advantage over the proposed route and, therefore, do not recommend the alternative.

3.4 COMPRESSOR STATION 206 SITE AND ACCESS ALTERNATIVES

3.4.1 Compressor Station 206 Site Alternatives

In addition to considering system alternatives that could potentially replace the need for Compressor Station 206 (see section 3.2.2.2), we also evaluated alternative locations for the compressor station.

Transco's hydraulic modeling indicates that a new 32,000 hp compressor station is required to transport the incremental capacity of the NESE Project and meet existing shipper commitments without materially degrading delivery pressures at existing delivery points. Hydraulic modeling also indicates that the new compressor station must be between MP 1780.0 in Mercer County, New Jersey and MP 1790.8 in Middlesex County, New Jersey. Locating the new compressor station upstream of MP 1780.0 would materially degrade pressure at downstream delivery points and would place the new facility operationally too close to existing Compressor Station 205 at MP 1773.5. The new compressor station could not be located downstream of MP 1790.8 because Transco's system splits at this point, with Mainlines A and E extending north and the LNYBL Loop C extending east to the Morgan M&R Station, where it connects to the LNYBL, which extends into offshore New Jersey and New York state waters. Compressor Station 206 could not be located on Mainlines A and E downstream of MP 1790.8 as LNYBL Loop C could not be compressed, and downstream of MP 1790.8 the LNYBL Loop C crosses high density residential neighborhoods in East Brunswick as it approaches existing Compressor Station 207 at MP 8.6. FERC staff reviewed Transco's hydraulic modeling and confirmed the siting envelope in which Compressor Station 206 would need to be located to meet the Project purpose. In the discussion below, we evaluate numerous alternative locations for Compressor Station 206 between MPs 1780.0 and 1790.8. We focused our review on sites within about 0.5 mile of Transco's existing Mainline system, as more distant alternatives would require increasingly longer inlet and outlet pipelines to connect the facility to the Mainline, affecting increasingly more landowners.

As depicted on figure 3.4.1-1 and listed in table 3.4.1-1, Transco considered 39 platted parcels within the siting envelope, including the proposed site and 2 additional sites identified by FERC staff. Transco only considered parcels if they encompassed at least 9.6 acres (600 feet by 700 feet), the area that Transco considered as the minimum needed to construct a 32,000 hp compressor station. We typically consider sites of at least 20 acres for new compressor stations to provide some buffer between the facility and adjacent properties; 36 of the 39 parcels are at least 20 acres, and the smallest parcel is about 18 acres.

All 39 sites were evaluated using the following, preliminary factors:

- Availability – 8 of the 39 sites are enrolled in the New Jersey Green Acres conservation program, 8 sites are occupied by residences or commercial structures, and 1 site is owned by the New Jersey Department of Transportation. For these reasons and additional factors listed in table 3.4.1-1, these 17 sites were eliminated from further consideration.

- Shape – Due primarily to their irregular shape, 5 of the 39 sites would be unable to reasonably accommodate the minimum construction or operational footprint of the compressor station. For this reason and additional factors listed in table 3.4.1-1, these five sites were eliminated from further consideration.

- Wetlands – For the remaining 17 sites we utilized NJDEP data, which indicate that wetlands cover between 23 and 88 percent of 12 of the sites, and that wetlands plus a 150-foot-wide wetland transition zone (New Jersey Freshwater Wetland Protection Rules (New Jersey Administrative Code (NJAC) 7:7A)) cover between 51 and 100 percent of these 12 sites. Furthermore, based on wetland location, none of these sites possess sufficient, contiguous upland area to accommodate the minimum construction or operational footprints of the compressor station. Therefore, to minimize impacts on wetlands and for additional factors listed in table 3.4.1-1, these 12 sites were eliminated from further consideration.

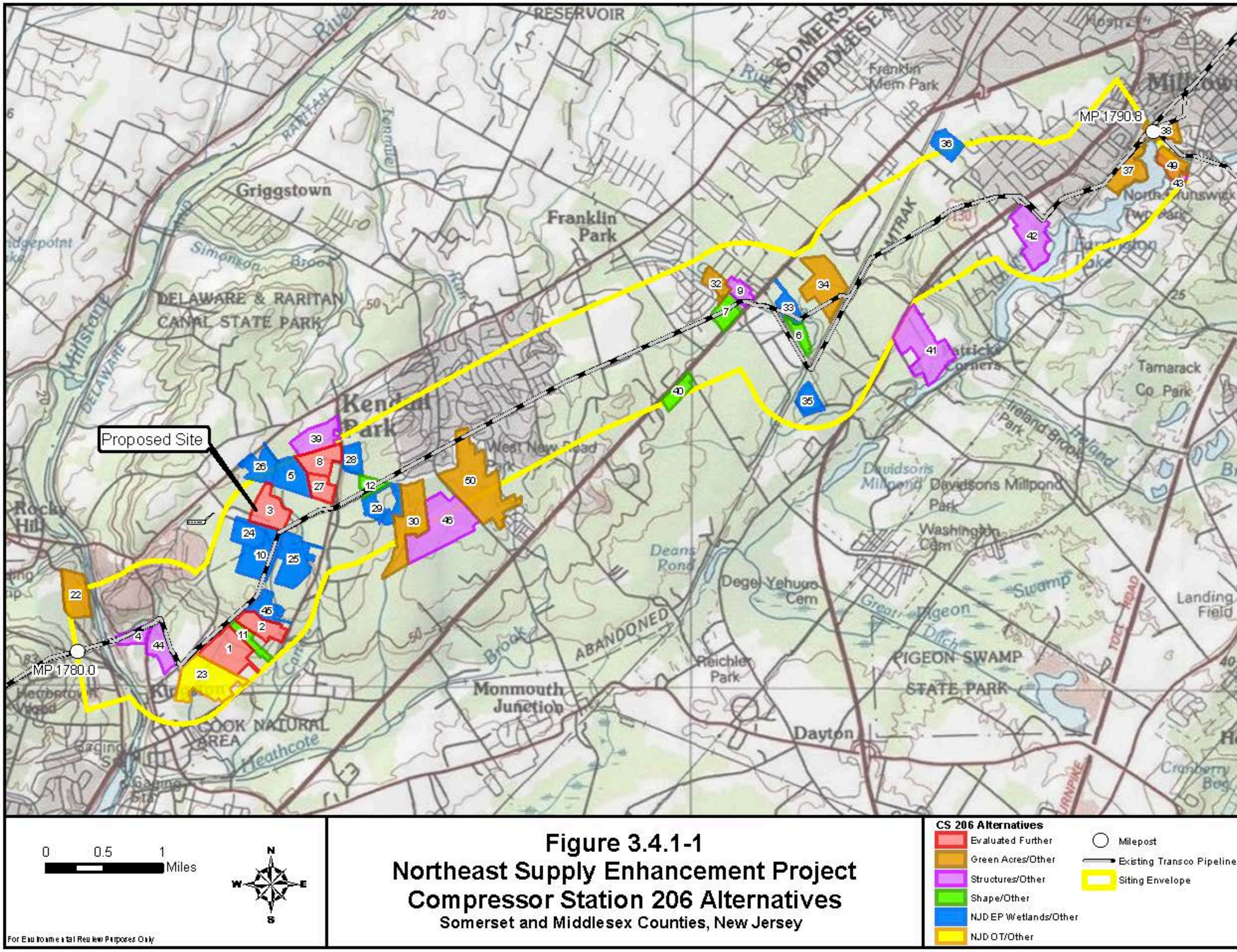


Figure 3.4.1-1
Northeast Supply Enhancement Project
Compressor Station 206 Alternatives
Somerset and Middlesex Counties, New Jersey

TABLE 3.4.1-1

Preliminary Review of Compressor Station 206 Site Alternatives

Site	Size (acres)	Reason for Elimination from Further Consideration: Preliminary Factors – Availability – Green Acres [a]	Structures	Government Owned	Shape	Wetland / Wetland + Buffer [b] (acres (percent of site))	Additional Factors – Residences within 0.5 mile	Other [c]
22	51.3	X				[a]	Over 250	Abuts Delaware and Raritan Canal State Park.
30	89.3	X				[a]	Over 200	Wooded parcel abuts neighborhood.
32	21.3	X				[a]	Over 300	Wooded lot abuts school.
34	79.3	X				[a]	Approximately 40 apartment buildings, 60 residences	Wooded parcel abuts industrial facilities; community park within 0.5 mile.
37	47.1	X				[a]	Over 300	Wooded parcel abuts neighborhood and Farrington Lake.
38	27.3	X				[a]	Over 300	Wooded parcel abuts neighborhood and Farrington Lake.
49	29.7	X				[a]	Over 300	Wooded parcel abuts neighborhood and Farrington Lake.
50	153.1	X				[a]	Over 250	Woodlot Community Center site; abuts neighborhoods.
4	19.4		X			[a]	14	Residential property; abuts Delaware and Raritan Canal State Park, FMC Higgins Disposal Superfund site, and Trap Rock quarry; Rockingham historic site 0.25 mile.
9	19.9		X			[a]	Over 200	Occupied by mobile home park.
39	47.2		X			[a]	Approximately 90	Wooded site with residence near intersection of County Road 518 and Route 27.
41	106.5		X			[a]	Over 200	Largely developed site including solar panel fields.
42	67.4		X			[a]	Over 200	Wooded and open parcel with residence and abuts Farrington Lake; residences abut site.
43	18.8		X			[a]	Over 300	Occupied site abuts Farrington Lake.
44	38.1		X			[a]	19	Residential property; on FMC Higgins Disposal Superfund site; abuts Trap Rock quarry; Rockingham historic site 0.2 mile southwest.
46	120.4		X			[a]	Approximately 90	Wooded and open parcel with residence and under development; abuts Woodlot Community Center.

TABLE 3.4.1-1 (cont'd)

Preliminary Review of Compressor Station 206 Site Alternatives

		Reason for Elimination from Further Consideration						
		Preliminary Factors					Additional Factors	
		Availability						
Site	Size (acres)	Green Acres [a]	Structures	Government Owned	Shape	Wetland / Wetland + Buffer [b] (acres (percent of site))	Residences within 0.5 mile	Other [c]
23	92.9			X		[a]	Over 200	Wooded parcel owned by the New Jersey Department of Transportation.
6	17.8				X	[a]	Over 200 homes and 8 apartment buildings	Wooded site.
7	29.7				X	[a]	Over 300	Wooded site; abuts neighborhood and two mobile home parks.
11	19.9				X	[a]	Over 200	Wooded site abuts Route 27.
12	17.0				X	[a]	Over 250	Wooded parcel abuts Transco right-of-way and neighborhoods.
40	22.5				X	[a]	Over 300	Partly wooded parcel along State Highway 1 and abutting Beech Woods park.
5	47.2					19.1 (40) / 28.8 (61)	Approximately 35	Wooded site abuts proposed site; nearer to intersection of County Road 518 and Route 27.
10	62.1					54.9 (88) / 61.6 (98)	Approximately 15	Wooded site abuts proposed site and nearer to Trap Rock quarry.
24	36.4					15.6 (43) / 28.3 (78)	1	Wooded site abuts proposed site and Trap Rock quarry.
25	65.8					52.7 (80) / 61.4 (93)	Over 75	Wooded site behind homes and businesses along Route 27.
26	36.7					20.8 (57) / 34.1 (93)	Approximately 50	Wooded parcel abuts proposed site and homes along County Road 518.
28	23.2					9.9 (43) / 16.8 (72)	Over 200	Wooded parcel adjacent to Route 27; abuts residences and businesses.
29	35.1					24.9 (71) / 33.3 (95)	Over 200	Wooded parcel abuts neighborhood.
31	26.2					11.7 (45) / 20.3 (77)	Over 300	Wooded parcel abuts neighborhood.
33	21.3					10.0 (47) / 17.0 (80)	Over 100	Wooded site off of Route 1.
35	24.2					9.2 (38) / 19.4 (80)	Over 200	Wooded parcel abuts mobile home park.
36	26.0					21.0 (81) / 26.0 (100)	Over 300	Wooded parcel abuts fully developed residential and commercial area.
45	27.8					6.5 (23) / 14.2 (51)	Over 200	Wooded parcel behind homes along Route 27.
1	69.8						Further evaluated – see table 3.4.1-2	
2	37.9						Further evaluated – see table 3.4.1-2	

TABLE 3.4.1-1 (cont'd)

Preliminary Review of Compressor Station 206 Site Alternatives

		Reason for Elimination from Further Consideration						
		Preliminary Factors					Additional Factors	
		Availability						
Site	Size (acres)	Green Acres [a]	Structures	Government Owned	Shape	Wetland / Wetland + Buffer [b] (acres (percent of site))	Residences within 0.5 mile	Other [c]
3	52.4						Further evaluated – see table 3.4.1-2 (proposed site)	
8	41.0						Further evaluated – see table 3.4.1-2	
27	26.0						Further evaluated – see table 3.4.1-2	

[a] The Green Acres Program was created in New Jersey in 1961 to address the state's growing recreation and conservation requirements. The goal of the Green Acres Program is to create a network of open spaces and recreational resources for public use and enjoyment. See section 4.7.5.1 for additional discussion.

[b] NJDEP wetlands and 150-foot wetland buffer per New Jersey Administrative Code 7:7A. Sites with no data indicated may also contain NJDEP wetlands and wetland transition zones, but were eliminated from further consideration for other reasons as indicated.

[c] Distances indicated from center of the site.

The preliminary review process described above identified five parcels (Sites 1, 2, 3 (Transco's proposed site), 8, and 27) within the siting envelope that could potentially host Compressor Station 206 and these sites were evaluated further (see table 3.4.1-2 and figures 3.4.1-2 and 3.4.1-3). For our analysis, we assumed the same 9.6-acre construction area and 8.0-acre operation area for the compressor station. Our analysis also includes impacts associated with a permanent access road to each site and the tie-in pipelines that would be required to connect the compressor station to Transco's existing Mainline pipeline, and we assumed the same construction and operation rights-of-way widths for the access road and tie-in pipelines for each site.

TABLE 3.4.1-2

Compressor Station 206 Site Alternatives for Further Review

	Site Alternative [a]				
Factor	1	2	3 (Proposed)	8	27
Parcel size (acres)	69.7	37.9	52.3	41.0	26.0
Parcel use	Vacant, wooded	Vacant, wooded	Vacant, wooded	Vacant, wooded	Vacant, wooded
Length of access road (feet)	1,570	80	3,360	621	105
Tie-in pipe length (feet)	797	430	852	1,857	512
Construction workspace (acres)	14.5	10.5	18.8	14.4	10.8
Operation workspace (acres)	12.9	8.9	17.2	12.8	9.2
Construction impact forest (acres)	14.0	10.4	16.0	13.8	10.5
Operation impact forest (acres)	12.4	8.8	14.8	12.2	8.7
Construction impact wetlands [b] (acres)	4.4	2.5	4.2	0.3	1.6
Operation impact wetlands [b] (acres)	3.6	2.0	4.2	0.3	1.5
Construction impact wetland 150-foot buffer [b, c] (acres)	8.1	3.6	3.6	5.8	5.1
Operation impact wetland 150-foot buffer [b, c] (acres)	7.4	3.3	3.5	5.1	4.5
Construction impact potential NJDEP vernal pool habitat [d] (acres)	0.0	0.0	0.0	9.7	0.0
Waterbodies crossed [e] (number)	3	2	4	1	0
Residences within 0.25 mile [f] (number)	0	1	0	18	21
Residences within 0.5 mile [f] (number)	135	235	8	110	135
Distance/direction to nearest residence (feet)	1,480 SE	1,540 E	2,460 W	605 SE	525 NE
Distance/direction to nearest place of worship [f] (feet)	1,700 SE	2,600 S	2,600 E	3,500 S	2,200 S
Distance/direction to nearest school/daycare [f] (feet)	1,300 SE	3,000 S	6,300 NE	2,400 NE	3,450 NE

[a] Impact acreages based on standardized 9.6-acre construction workspace and 8-acre operation footprint for the compressor station site; 100-foot-wide construction and operation right-of-way for the access road; and 80-foot-wide construction right-of-way and 40-foot-wide operation right-of-way for the inlet and outlet tie-in pipelines.
[b] Wetland and waterbody impacts are based on remote sensing methods for all sites.
[c] Assumed the most conservative buffer for the State of New Jersey of 150 feet.
[d] Based on NJDEP data which identified wetlands at the proposed Compressor Station 206 site as a "potential vernal habitat area." Field surveys did not identify any vernal pools at the proposed site.
[e] Waterbodies within construction footprint of compressor station site or crossed by access road and tie-in pipelines. Based on remote sensing methods for all sites.
[f] Distances measured from center of 8-acre operational footprint of compressor station site. Numbers of residences estimated from aerial photographic imagery.

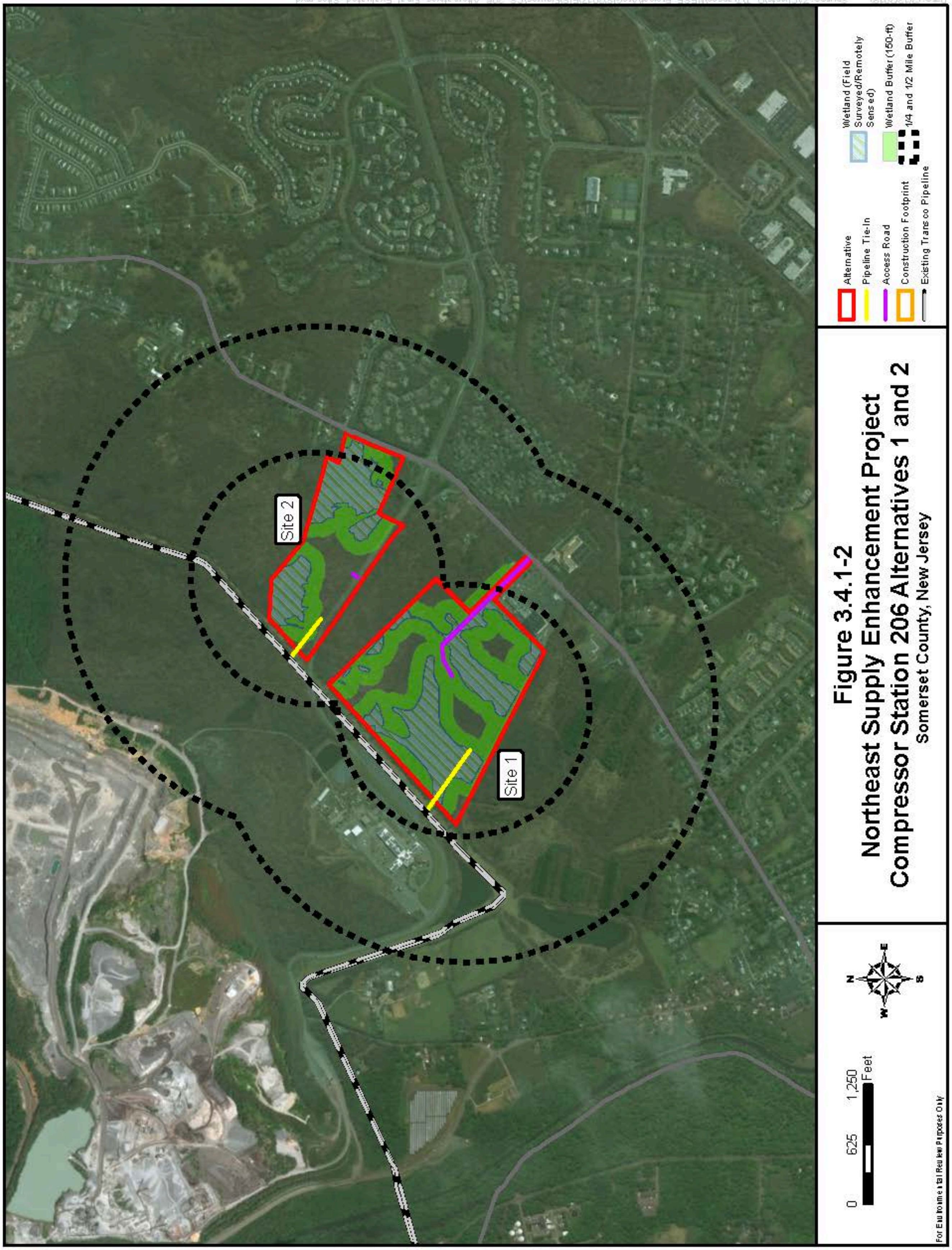
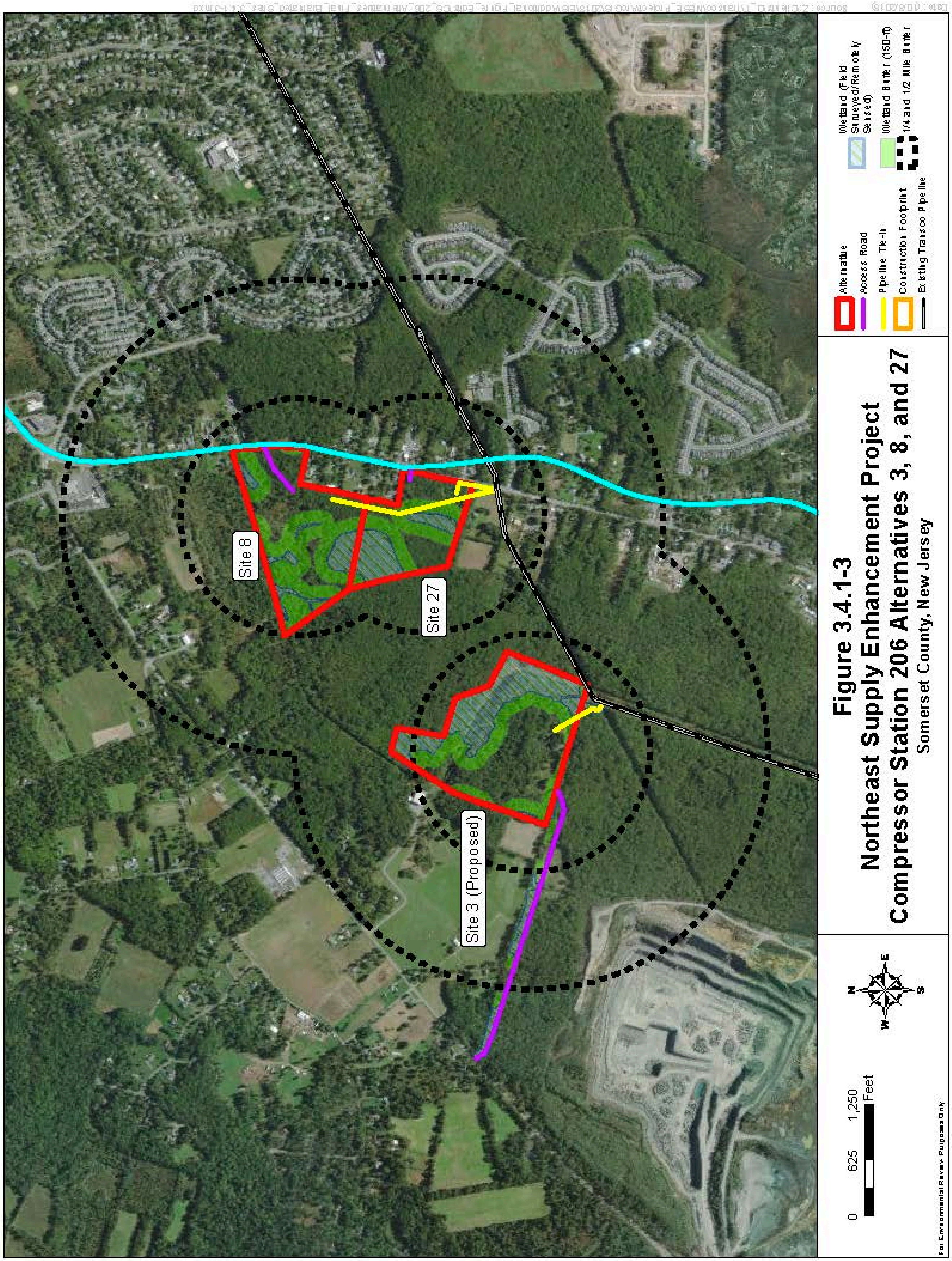


Figure 3.4.1-2
Northeast Supply Enhancement Project
Compressor Station 206 Alternatives 1 and 2
Somerset County, New Jersey
Site 1
Site 2
Alternative
Pipeline Tie-In
Access Road
Construction Footprint
Existing Transco Pipeline
Wetland (Field Surveyed/Remotely Sensed)
Wetland Buffer (150-ft)
1/4 and 1/2 Mile Buffer
0
625
1,250
Feet
N
E
S
W


Site 8
Site 27
Site 3 (Proposed)
Figure 3.4.1-3
Northeast Supply Enhancement Project
Compressor Station 206 Alternatives 3, 8, and 27
Somerset County, New Jersey
Alternative
Access Road
Pipeline Tie-In
Construction Footprint
Existing Transco Pipeline
Wetland (Field Surveyed/Remotely Sensed)
Wetland Buffer (150-ft)
1/4 and 1/2 Mile Buffer
0
625
1,250
Feet
N
E
S
W

We received comments expressing concern regarding the proximity of the proposed Compressor Station 206 site to Higgins Farm Superfund site and Trap Rock quarry. More specifically, commenters were concerned that construction and operation of Compressor Station 206 could affect EPA's ongoing groundwater remediation at the Higgins site, and that blasting at the quarry could damage the compressor station, resulting in a public safety incident. These impacts are considered in sections 4.3.1.6 and 4.11.4, respectively. We conclude in section 4.0 that the proposed location for Compressor Station 206 would not affect or be affected by these sites. Therefore, proximity to the Higgins Farm Superfund site and Trap Rock quarry is not considered a factor in our analysis of alternative sites.

As discussed throughout section 4.0, we received many comments about Transco's proposed location for Compressor Station 206. The majority of comments were related to proximity of the station to homes, schools, daycare centers, and places of worship, and concerned operational noise, visual impacts, increased traffic, public safety (including due to blasting at Trap Rock quarry), and impacts on property values. Although we conclude in section 4.0 that proposed Compressor Station 206 would not significantly impact residences, schools, daycare centers, and places of worship, and would not pose a significant public safety risk, we included the proximity of the five alternative sites to these facilities in our analysis.

We also considered potential impacts on wetlands and waterbodies in our analysis. Certified Professional Wetland Scientists contracted by Transco applied remote sensing methods to characterize wetlands and waterbodies on the five alternatives, including the use of high-resolution, four-band (red, green, blue, and near infra-red) aerial photographic imagery collected during leaf-off winter conditions. Ponded water, areas of higher surface moisture, and emergent vegetation consistent with wetland signatures are more readily identified using the near infra-red band within multi-spectral imagery. In addition, high-resolution elevation data was generated from the aerial imagery using photogrammetric techniques and was then used to develop a digital elevation model of the parcels which aided in the interpretation of wetlands and waterbodies. In addition to the Project-specific aerial imagery and topographic data that was collected, various publicly available digital data sets such as the National Wetland Inventory, Federal Emergency Management Agency (FEMA) floodplain data, and Soil Survey Geographic Database (SSURGO) hydric soils data, were used to supplement the remote sensing process. FERC staff reviewed Transco's remote sensing methodology and determined the procedures and results to be acceptable for the purpose of our alternatives review. We located the compressor station, access road, and tie-in pipelines at each site to minimize impacts on wetlands and waterbodies.

Site 1 is a 69.7-acre wooded parcel situated between a retail mall and the Trap Rock quarry, about 1.2 miles south-southwest from Transco's proposed site (Site 3). The length of the tie-in pipelines to Site 1 and the proposed site are similar, but the access road to Site 1 is 1,790 feet shorter than the access road to Site 3. As a result, construction and operation at Site 1 would affect about 4.3 acres less land than at Site 3. Compared to Site 3, Site 1 would also impact 2.0 acres less forest during construction, and 2.4 acres less forest during operation. Construction and operation at Site 1 would impact a similar area of wetlands as Site 3. However, as indicated on figure 3.4.1-2, the uplands on Site 1 occur in small, separated areas. Therefore, permanent wetland impacts associated with the operational footprint of the compressor station could not be avoided at Site 1. In comparison and as indicated on figure 3.4.1-3, Site 3 includes a large, contiguous upland area on which the compressor station could be built, complying with our Procedures to avoid placing aboveground facilities in wetlands. Also, due to the widespread location of wetlands and waterbodies on Site 1, construction and operation at Site 1 would affect about twice the area of NJDEP-designated wetland and waterbody transition zone as would Site 3. Regarding proximity to residences, there would be no homes within 0.25 mile of either Site 1 or Site 3, but the nearest home to Site 1 would be nearly 1,000 feet closer to the compressor station than the nearest home to Site 3, and 127 more homes would be within 0.5 mile of Site 1 as compared to Site 3. Site 1 would also be closer to the nearest place of worship and nearest school or daycare center. In summary, the primary advantage of Site 1 is that slightly less land and forested area would be affected during construction and operation of Compressor Station 206, primarily due to the shorter length of road needed to access the site. However, Site 1 would result in similar overall wetland impacts, but require locating the compressor station partly within wetlands, and impact twice the amount of NJDEP-designated wetland and waterbody transition areas. In balancing the advantages and disadvantages of Sites 1 and 3, we conclude that Site 1 does not offer a significant environmental advantage over Transco's proposed site, and do not recommend the alternative.

Site 2 is a 37.9-acre wooded parcel near the intersection of Route 27 and Promenade Boulevard, about 1.0 mile south from Transco's proposed site (Site 3). We assumed that access to the site would be via a 80-foot-long entrance off the existing Trap Rock quarry road, as compared to the 3,360-foot-long access road to Transco's proposed Site 3. The length of the tie-in pipelines to Site 2 would also be about 422 feet shorter than the tie-in pipelines to Site 3. As a result, compared to Site 3, construction and operation at Site 2 would each affect about 8.3 acres less land. Compared to Site 3, Site 2 would also impact 5.6 acres less forest during construction, and 6.0 acres less forest during operation. Construction and operation at Site 2 would also impact 1.7 and 2.2 acres less wetland, respectively, than at Site 3. However, as indicated on figure 3.4.1-2, permanent wetland impacts associated with the operational footprint of the compressor station could not be avoided at Site 2. In comparison and as indicated on figure 3.4.1-3, Site 3 includes a large, contiguous upland area on which the compressor station could be built, complying with our Procedures to avoid placing aboveground facilities in wetlands. Sites 2 and 3 would have a similar impact on NJDEP-designated wetland and waterbody transition zones. Regarding proximity to residences, one home would be within 0.25 mile of Site 2, whereas there are no homes within 0.25 mile of the proposed site. In addition, the nearest home to Site 2 would be 920 feet closer to the compressor station than the nearest home to Site 3, and 227 more homes would be within 0.5 mile of Site 2 as compared to Site 3, including many homes in the Princeton Walk neighborhood. Site 2 would be of a similar distance to the nearest place of worship as Site 3, but 3,300 feet closer to the nearest school or daycare center. In summary, slightly less land, forested area, and wetlands would be affected by construction and operation of Compressor Station 206 at Site 2 as compared to Site 3, primarily due to the shorter length of road needed to access Site 2. However, Site 2 would require that the compressor station be located, in part, in wetlands. Site 2 would also be closer to many more residences as well as the nearest school or daycare center. In balancing the advantages and disadvantages of Sites 2 and 3, we conclude that Site 2 does not offer a significant environmental advantage over Transco's proposed site, and do not recommend the alternative.

Site 8 is a 41.0-acre wooded parcel near the intersection of Route 27 and County Road 518, about 0.7-mile northeast from Transco's proposed site (Site 3). We assumed that access to the site would be via a new, 621-foot-long road off of Route 27, as compared to the 3,360-foot-long access road to Transco's proposed Site 3. Because of its offset from Transco's Mainline pipeline system, the tie-in pipelines to Site 8 would be 1,857 feet long, or 1,005 feet longer than the tie-in pipelines associated with Site 3. Due to the varying lengths of the access road and tie-in pipelines, construction and operation at Site 8 would each affect about 4.4 acres less land. Compared to Site 3, Site 8 would impact 2.2 acres less forest and 3.9 acres less wetland during construction, and 2.6 acres less forest and 3.9 acres less wetland during operation. However, construction and operation at Site 8 would impact more NJDEP-designated wetland and waterbody transition area. NJDEP desktop data also indicates that 9.7 acres of potential vernal pool habitat could be affected during construction at Site 8. A similar amount of potential vernal pool habitat was also indicated at Site 3; however, Transco's wetland surveys did not identify any vernal pool habitat at the proposed site. Therefore, we do not consider potential vernal pool habitat as a comparative factor between the sites. The primary disadvantage of Site 8 is proximity to residences. As depicted on figure 3.4.1-3, Site 8 abuts residential properties along Route 27, with the nearest home 605 feet from the center of the operational area for the compressor station, whereas the nearest home to proposed Site 3 is 2,460 feet to the west. A total of 18 residences would be within 0.25 mile from Site 8, whereas there would be no residences within 0.25 mile of Site 3, and about 102 more homes would be within 0.5 mile of Site 8 as compared to Site 3. Site 8 would also be nearly 3,000 feet closer to the nearest school or day care facility, but 900 feet further from the nearest place of worship. We also anticipate that a compressor station on Site 8 would be visible to neighbors and traffic on Route 27, whereas Transco's viewshed analysis indicates that the proposed compressor station on Site 3 would be visually screened from surrounding properties and roadways. In summary, placing Compressor Station 206 on Site 8 would reduce impacts on forest and wetlands as compared to the proposed Site 3, although both sites would avoid permanent wetland impacts associated with the compressor station itself. However, the 8.0-acre operating area of the compressor station at Site 8 would abut several residential properties and would be closer to many more residences as compared to the proposed site. In balancing the advantages and disadvantages of Sites 8 and 3, we conclude that Site 8 does not offer a significant environmental advantage over Transco's proposed site, and do not recommend the alternative.

Site 27 is a 26.0-acre wooded parcel adjacent to Site 8 and about 0.5-mile northeast from Transco's proposed site (Site 3). Due to the location of wetlands on Site 27, the operating area of the compressor station would essentially abut Route 27, requiring only a 105-foot-long access road, as compared to the 3,360-foot-long access road to Transco's proposed Site 3. Site 27 would also require 512-foot-long tie-in pipelines, or 340 feet shorter than the tie-in pipelines associated with Site 3. Due to the shorter access road and tie-in pipelines, construction and operation at Site 27 would each affect about 8.0 acres less land. Compared to Site 3, Site 8 would impact 5.5 acres less forest and 2.6 acres less wetland during construction, and 6.1 acres less forest and 2.7 acres less wetland during operation. However, as indicated on figure 3.4.1-2, permanent wetland impacts associated with the operational footprint of the compressor station could not be avoided at Site 27. In comparison, Site 3 includes a large, contiguous upland area on which the compressor station could be built, complying with our Procedures to avoid placing aboveground facilities in wetlands. Construction and operation at Site 27 would also impact more NJDEP-designated wetland and waterbody transition areas than would development of Site 3. Similar to adjacent Site 8, the primary disadvantage of Site 27 relative to the proposed Site 3 is proximity to residences. Site 27 abuts residential properties along Route 27, with the nearest home 525 feet from the center of the operational area for the compressor station, whereas the nearest home to proposed Site 3 is 2,460 feet to the west. A total of 21 residences would be within 0.25 mile from Site 27, whereas there would be no residences within 0.25 mile of Site 3, and about 127 more homes would be within 0.5 mile of Site 27 as compared to Site 3. The compressor station on Site 27 would also be closer to the nearest school or day care facility and place of worship, and would be visible to neighbors and traffic on Route 27, whereas the proposed compressor station on Site 3 would be visually screened from surrounding properties and roadways. In summary, placing Compressor Station 206 on Site 27 would reduce impacts on forest and wetlands as compared to proposed Site 3, although the use of Site 27 would require that the compressor station be located, in part, in wetlands. However, the 8.0-acre operating area of the compressor station at Site 27 would abut residential properties and Route 27, and would be closer to many more residences as compared to the proposed site. In balancing the advantages and disadvantages of Site 27 as compared to proposed Site 3, we conclude that Site 27 does not offer a significant environmental advantage over Transco's proposed site, and do not recommend the alternative.

3.4.2 Compressor Station 206 Access Alternative

As described in section 2.2.5, Transco proposes to construct a 3,300-foot-long permanent access road from County Road 518 to the Compressor Station 206 site. The access road would cross land owned by Trap Rock Industries. We received comments suggesting that Transco utilize the EPA's existing road on the Higgins Farm Superfund site to access Compressor Station 206 to avoid wetland impacts and move the access road further from residences. The EPA's existing road enters the Higgins property from County Road 518, crosses active pasture land, and ends at the EPA's groundwater treatment building on the northeast corner of the Higgins property. Depending on final design, we estimate that the EPA road would need to be extended 1,450 feet to reach the service road within the compressor station facility. It is also possible that the EPA road would need to be modified to accommodate heavy truck traffic during construction of the compressor station. Electric and municipal water utilities to the EPA groundwater treatment building would also need to be extended to the compressor station.

Extending the EPA road would permanently impact about 2.9 acres of forest as compared to 3.7 acres of forest that would be affected by the proposed access road. Wetland surveys were not conducted on the Higgins property, but assuming that no wetlands would be affected, extending the EPA road would avoid the 5.1 acres of wetland impacts associated with Transco's proposed road. Our review of aerial photography concludes that both the proposed road and the EPA road alternative would be approximately the same distance from residences.

In its September 7, 2017 supplemental filing, Transco summarized legal concerns with gaining access to and constructing on an active federal Superfund site and referenced a conservation easement between the Higgins family and Franklin Township. The conservation easement went into effect on July 17, 2017 and prohibits future non-agricultural use of the Higgins property, including the placement or removal of sand, gravel, loam, rock, or other materials other than required for agricultural purposes. For those and other reasons, Transco concluded that use of the EPA road was not practicable at the time.

Although extending the existing EPA road would reduce impacts on forest and wetland resources, the construction associated with the road and buried utilities could encounter contamination on the Superfund site, which was raised as a concern by commenters. In addition, the access road would be a permanent feature, resulting in daily traffic across the Higgins' pasture, whereas the current level of traffic on the EPA access road is episodic. We also note that members of the Higgins family have publicly opposed allowing Transco access across their property. It is generally the Commission's policy to avoid placing permanent aboveground facilities on an unwilling landowner's property if a reasonable alternative exists. While this road is not an aboveground facility, it is a permanent feature that would result in a significant impact on the landowner that, if used, would likely conflict with the existing conservation easement because fill materials are likely necessary to improve the road. For these reasons, we conclude that extension and modification of the existing EPA access road would not present a significant environmental advantage over Transco's proposed access road and do not recommend the alternative.

3.5 ELECTRIC MOTOR-DRIVEN COMPRESSION ALTERNATIVE AT COMPRESSOR STATION 206

In response to comments expressing concern regarding air emissions and noise associated with Compressor Station 206, we considered the potential to utilize EMD compressor units at the station rather than natural gas-powered turbines as proposed by Transco. It is estimated that at least 22,000 kilowatts of power would be needed to create 32,000 hp of EMD compression, and other electric power infrastructure would be needed, including a new, high voltage power line to the compressor station, and an electric substation at the site. For this analysis, the new electric transmission line begins at the nearest existing substation to the compressor station, near the intersection of U.S. Highway 1 and Ridge Road in Middlesex County (see figure 3.5-1). The transmission line extends for about 3.9 miles, following existing roads and Transco's right-of-way for 2.9 miles (74 percent) and crossing a wooded and residential area between Ridge Road and Raymond Road for 1.0 mile (26 percent) of its length.

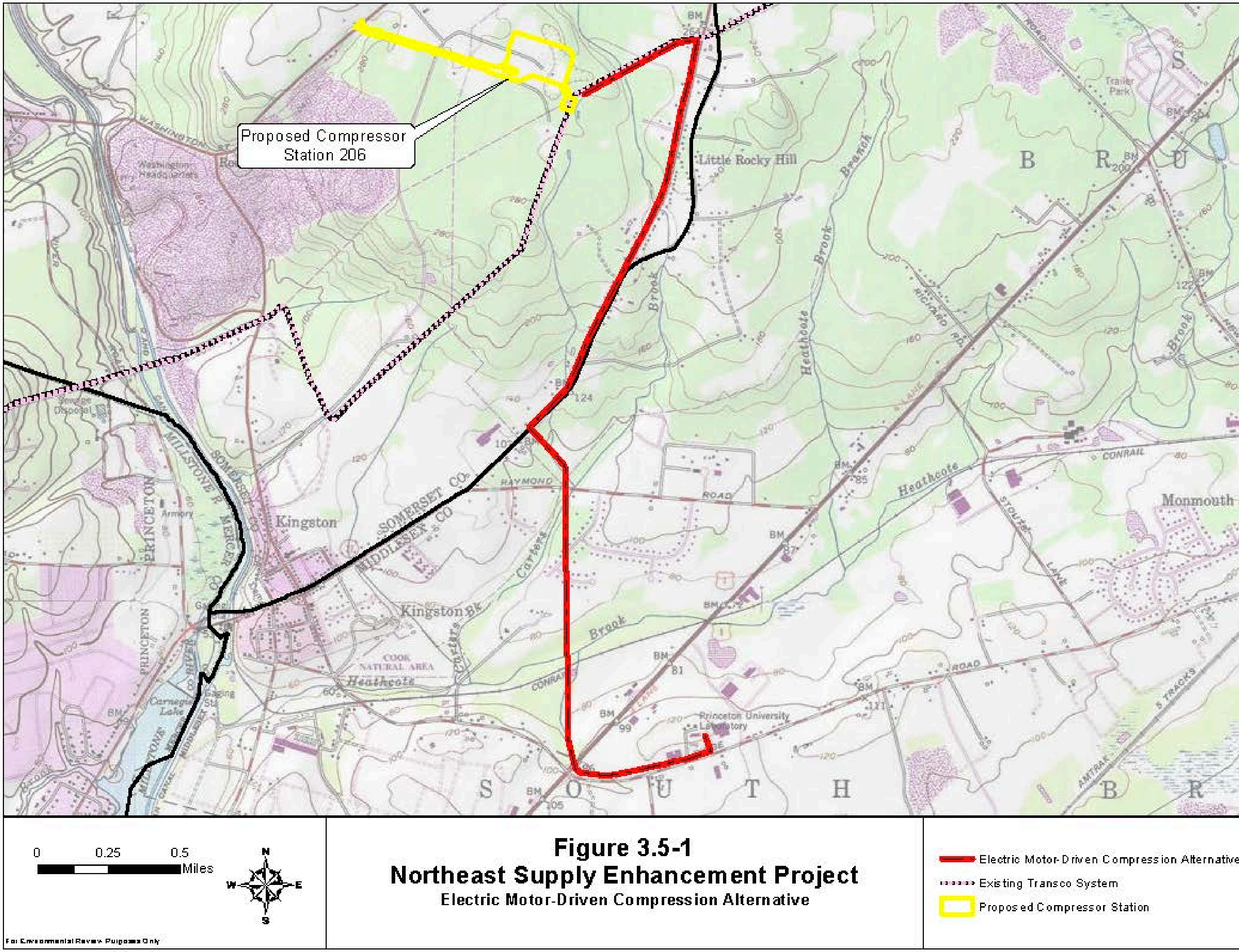


Figure 3.5-1
Northeast Supply Enhancement Project
Electric Motor-Driven Compression Alternative

Table 3.5-1 compares the impacts of the EMD Compression Alternative to Transco's proposal. Because the EMD Compression Alternative would include an electric transmission line and electric substation, the alternative would affect 47.6 acres more land during construction and 24.0 acres more land during operation. As a result of this increased footprint, about 20.0 acres more forest, 15.3 acres more wetland, and 5 more streams would be affected during construction of the alternative. Construction of the alternative would also impact 4.2 acres more public and recreational land and place construction within 50 feet of 43 more homes. The EMD Compression Alternative would also result in greater permanent impacts on forest and public lands, but would have the same operational impact on wetlands as Transco's proposal, assuming that the electric transmission towers and other permanent electric facilities could be sited to avoid wetlands. The electric transmission towers and overhead power lines of the EMD Compression Alternative would also have an additional, permanent, visual impact on the area.

TABLE 3.5-1

Analysis of the Electric Motor-driven Compression Alternative at Compressor Station 206

Factor	EMD Compression Alternative [a]	Proposed Natural Gas Compression [b]
Length of Electric Transmission Line (miles)	3.9	0
Construction Impacts (acres)	77.2 [c]	29.6
Operational Impacts (acres)	49.6 [d]	25.6
Construction Impacts on Forest (acres)	37.7 [c]	17.7
Operational Impacts on Forest (acres)	22.4 [d]	14.3
Construction Impacts on Wetlands (acres)	20.8 [c]	5.5
Operational Impacts on Wetlands (acres)	5.5 [d, e]	5.5
Stream Crossings (number)	9	4
Construction Impacts on Local, State, Federal and Recreational Lands (acres)	4.2	0
Operation Impacts on Local, State, Federal and Recreational Lands (acres)	2.1	0
Residences within 50 feet of Construction Right-of-way (number)	43	0
Road Crossings (number)	10	0

a Based on desktop sources. Routing and scale of non-jurisdictional facilities and associated impacts would be determined by the local utility company.
b Based on site-specific information and includes the permanent access road and inlet/outlet pipelines.
c Based on an assumed 100-foot-wide construction right-of-way for the electric transmission line and 0.4-acre substation at the Compressor Station 206 site.
d Based on an assumed 50-foot-wide operating right-of-way for the electric transmission line and 0.4-acre substation at the Compressor Station 206 site.
e Assumes that final siting of electric facilities would avoid permanent impacts on wetlands.

Selection of the EMD Compression Alternative would avoid the local operating air emissions associated with the natural gas-powered turbines proposed at Compressor Station 206. However, electricity is a secondary source of energy, i.e., other primary sources of energy such as fossil fuels (coal, oil, natural gas), nuclear, wind, solar, and hydroelectric are required to generate electricity. In North America, Regional Transmission Organizations and Independent System Operators manage and coordinate the movement of wholesale electricity among the various generators in their region and between regions to ensure reliable electric service. New Jersey is in a 13-state region in which electricity is managed by PJM Interconnection (PJM). Electricity in the PJM region is generated by a typical mix of natural gas (32 percent), nuclear (31 percent), coal (27 percent), and renewables (9 percent) sources. To enable compliance with states' mandates for fuel mix and emissions disclosure, PJM calculates emissions for all electric generators in its region using facility-specific data and data from other public sources, including:

- EPA unit-level annual emissions from continuous emission monitoring systems for generators in the acid rain program;

- EPA Emissions and Generation Resource Integrated Database emission rates; and
- Fuel-type default factors.

Table 3.5-2 compares the nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon dioxide (CO_2) emissions resulting from the proposed natural gas turbines at Compressor Station 206 (see section 4.10.1) to the emissions that would result from creating the electricity needed to power the EMD Compression Alternative (PJM, 2016). Table 3.5-2 provides the emission factors for each pollutant on a unit basis and the estimated annual emissions assuming 22,000 kilowatt-hours and continuous operation, representing an annual electric energy demand of 192,720 megawatt-hours for the EMD Compression Alternative.

TABLE 3.5-2

Comparison of Air Emissions Associated with the EMD Compression Alternative to the Proposed Natural Gas Turbines at Compressor Station 206

Factor	Compressor Station 206 Natural Gas Turbines [a]	Electric Motor-Driven Alternative		
		Marginal On-Peak [b]	Marginal Off-Peak [c]	2015 PJM System Average [d]
NO_x				
Emission Factors (lb/MWh)	0.26	1.8	1.46	0.78
Annual Emission Estimates (tpy) [e]	22.74	173.45	140.68	75.16
SO_2				
Emission Factors (lb/MWh)	0.04	3.34	3.46	1.61
Annual Emission Estimates (tpy) [e]	3.1	321.84	333.41	155.14
CO_2				
Emission Factors (lb/MWh)	1,527	1,647	1,541	1,014
Annual Emission Estimates (tpy) [e]	130,943	158,705	148,491	97,709

[a] Potential to emit as calculated and discussed in section 4.10.1.
[b] Marginal On-Peak refers to all non-holiday weekdays from 7 a.m. through 11 p.m.
[c] Marginal Off-Peak refers to all hours that are not Marginal On-Peak.
[d] PJM values represent system average.
[e] Based on continuous operation of 8,760 hours per year.
lb/MWh = pounds per megawatt-hour.
tpy = tons per year.

Three emission scenarios are provided for the EMD Compression Alternative including the 2015 PJM System Average, Marginal On-Peak, and Marginal Off-Peak. The 2015 PJM System Average represents the emissions associated with the average performance of all the generating facilities in the PJM region, whereas the Marginal On-Peak and Marginal Off-Peak scenarios represent the emissions associated with specific, strategic generating units that generally operate during periods of increasing demand. The regional NO_x and SO_2 emissions associated with the EMD Compression Alternative substantially exceed the emissions from the use of natural gas at Compressor Station 206 in all three generating scenarios. CO_2 emissions from the natural gas turbines exceed the 2015 PJM System Average scenario but, as noted above, about 31 percent of electric generation in the 2015 PJM System Average comes from nuclear baseload generation, a zero-greenhouse gas (GHG) emission fuel source. The CO_2 emissions from the natural gas turbines are less than the Marginal On-Peak and Marginal Off-Peak scenarios, which are more comparable to Transco's anticipated operation of Compressor Station 206 to meet periods of increased customer demand for natural gas.

Using EMD units at Compressor Station 206 would result in less operating noise than using natural gas-powered turbines due to the absence of air inlet and exhaust noise. However, as discussed in section 4.10.2, modeling indicates that the noise from operating the gas-powered turbines would not exceed our compliance criteria of 55 decibels on the A-weighted scale (dBA) at the NSA to the compressor station. Also, in section 5.2, we recommend that any Order that the Commission may issue approving the NESE Project include a condition that Transco conduct monitoring to confirm that actual operating noise from Compressor Station 206 complies with our compliance criteria at nearby NSAs.

In conclusion, the EMD Compression Alternative would result in greater impacts on most resources and affect numerous more homeowners during construction than use of natural gas-powered compressor units as proposed by Transco. The primary advantage of the EMD Compression Alternative is that it would avoid the local air emissions; however, the alternative would result in greater regional emissions due to the mix of primary energy sources used to generate electricity in the region. As discussed in section 4.10, we conclude that the proposed natural gas-powered turbines would be considered a minor source of emissions under federal air quality programs, that associated concentrations would be well below the National Ambient Air Quality Standards (NAAQS) which are protective of public health, and that the facility would comply with our operating noise criteria at nearby NSAs. For these reasons, we conclude that the EMD Compression Alternative does not offer a significant environmental advantage over Transco's proposed use of natural gas at Compressor Station 206, and do not recommend the alternative.

3.6 TRENCHING METHOD ALTERNATIVES FOR THE RARITAN BAY LOOP

As discussed in section 2.3.3, 22.1 miles (95 percent) of the Raritan Bay Loop would be installed within a trench on the seafloor, accounting for 92 percent of the total volume of sediment excavated during construction. Transco consulted with the USACE and other agencies regarding construction methods that would meet pipeline and marine navigation safety requirements and reduce impacts on aquatic resources primarily by minimizing turbidity, sedimentation, and construction duration.

Any trenching method must meet the following safety requirements:

- Burial Depth. To ensure adequate protection, the USACE requires that the Raritan Bay Loop be buried with a minimum of 7 feet of cover (or protective equivalent) in soft sediment in unmaintained anchorage areas including anchorage area 28 between MPs 24.0 and 24.8. In the Raritan Bay and Chapel Hill Channels, the USACE requires that the pipeline be buried with a minimum of 15 feet of cover. For all other locations the USACE requires that the pipeline be buried with a minimum of 4 feet of cover (or protective equivalent).

- Avoidance of Navigation Hazard. The USACE requires that Transco implement pipeline construction methods that do not result in a navigation hazard. For this reason, Transco proposes to use the pre-lay process in certain areas where the pipeline would be laid in a previously excavated trench, thereby avoiding the marine navigation hazard that would result if the pipeline were assembled first and left on the seafloor pending subsequent burial. Transco would use the pre-lay process in shallow water (less than 15 feet deep) between MPs 12.5 and 16.6, to cross the Raritan Bay and Chapel Hill Channels, in the USACE-designated anchorage area between MPs 24.0 and 24.8, and Class C sediment areas between MPs 25.2 to 25.6 and MPs 33.5 to 33.9. For all excavation in less than 15 feet of water, Transco would barge the spoil to an approved disposal site rather than side casting the material and creating mounds that would pose a navigation hazard.

Table 3.6-1 compares environmental and operational factors associated with various trenching methods and available equipment. Transco proposes to use a clamshell dredge to excavate the trench for the 7.2 miles of pipeline that necessitates a pre-lay process, and a jet trencher to install 14.9 miles of the pipeline using a post-lay process. The clamshell dredge and jet trencher methods are described in section 2.3.3.4.

TABLE 3.6-1

Comparison of Trenching Alternatives for the Raritan Bay Loop

	Post-Lay Only Methods			Pre- and Post-Lay Methods		
Consideration	Jet Trencher [a]	Jet Sled [a, b]	Plough [a, c]	Clamshell Dredge [d, e, f]	Backhoe Dredge [g, h]	Hopper Dredge [i, j]
Typical Equipment Size (length x width x height)	24 x 18 x 10 feet	15 x 7 x 7 feet	70 x 70 x 30 feet	20-50 cubic foot bucket	10 x 6 x 12 feet	Head 10 x 5 x 3 feet
Equipment Weight (submerged; tons)	1	3-10	15-150	2-10 ton bucket	5-7	12
Equipment Availability (current 2017 market) [k]	Multiple	Three units	One unit	Multiple	Three units	Three units
Water Depth Limitation(s)	No minimum	Minimum 10 feet	Minimum 10 feet	None	Maximum 10 feet	Minimum 10 feet
Estimated Trenching Speed	246 feet/hr	76 feet/hour	37 feet/hour	417 cubic yards/hour	208 cubic yards/hour	1,000 cubic yards/hour
Excavation Depth Minimum/Maximum (feet)	– /9.8	4/7	4/7	6.5/18	4/7	4/7
Trench Top Width (feet)	9	26	30	59-91	59-91	100
Trench Top + Sediment Placement Width (feet)	9	26	72	59-91	59-91	100
Sediment Displaced per Mile/Total (yd^3)	17,416/ 276,920 [l]	14,227/ 226,219	24,899/ 395,895	87,193/ 540,600 [l]	87,193/ 130,790 [g]	262,774/ 236,497
Material Deposit Location	5% dispersed	90% dispersed	Side cast with 10% dispersed	Side cast or scow overflow with 2.5% loss or scow no overflow 0.5% loss dispersed	Side cast or scow with 30% dispersed	Side cast or scow
Extent of Sedimentation	Low	High	Low	Low	Low to Medium	Medium
Suspended Sediment Plume – Upper Water Column	Low	High	Low	Low [m]	Medium	Low to Medium
Suspended Sediment Plume – Lower Water Column	Low	Low	Medium	Low [m]	Medium	Medium to High
Construction Duration	Shortest	Shorter	Longer	Longest	Longest	Longest

a Post-lay methods would be used for 14.9 miles, between MPs 16.6 and 17.2, MPs 18.0 and 24.0, MPs 25.6 and 29.5, MPs 30.4 and 33.5, and MPs 33.9 and 35.2.
b Jet sled equipment based on information received from LL&G.
c Plough equipment based on information received from IHC.
d The clamshell dredge would be used for 7.2 miles, between MPs 12.5 and 16.6, MPs 17.2 and 18.0, MPs 24.0 and 25.6, MPs 33.5 and 33.9, and MPs 35.2 and 35.5.
e Clamshell dredger equipment based on information received from NY Bay Dredgers.
f Actual trench will be excavated for post-lay operation. Pre-lay information is for comparison only.
g Due to water depth limitations, the backhoe dredger could only be used for 1.5 miles between MPs 12.5 and 14.0.
h Backhoe dredger equipment data based on information from James Fisher.
i Transco considered using a hopper dredger to trench across the Raritan Bay Channel (MPs 17.2 to 18.0) and the Chapel Hill Channel (MPs 24.8 to 25.2).
j Hopper dredger equipment data based on information from IHC.
k Availability based on current bidder proposals.
l From the September 2017 Hydrodynamic and Sediment Transport Modeling Results-Base Case.
m Transco would use an environmental bucket for all clamshell excavation which would be expected to result in low suspended sediment plumes in the upper and lower water column and low sedimentation.

As an alternative to using a clamshell dredge in the pre-lay process, we considered the use of a barge-mounted backhoe dredge to excavate the trench. Unlike clamshell dredge buckets, which are raised and lowered by cables and can operate in all Project water depths, a backhoe bucket is limited by the reach of a mechanical boom and could only attain the required burial depth in waters less than 10 feet deep between MP 12.5 and approximate MP 14.0. A backhoe dredge would also result in slightly greater sediment dispersal and take approximately twice as long to complete trenching as would a clamshell dredge. Also, since issuance of the draft EIS, Transco stated that it intends to utilize an environmental bucket for all clamshell excavation, further reducing turbidity and sedimentation in the offshore environment. For these reasons, we determined that a backhoe dredge does not offer a significant environmental advantage over the clamshell dredge and, therefore, do not recommend the alternative.

We also considered the use of a hopper dredge to excavate the trench across the Raritan Bay and Chapel Hill Channels (a total length of about 0.9 mile). A hopper dredge involves a ship that drags a mechanical head along the seafloor, utilizing suction to remove sediment, which is then either side cast or stowed aboard ship pending off-site disposal. Due to water depth restrictions, a hopper dredge would be unable to excavate the entire length of trench where other pre-lay construction is required, and only three units are currently available, raising concern about the availability of the equipment for construction. Also, since issuance of the draft EIS, Transco stated that it intends to utilize an environmental bucket for all clamshell excavation, including across the Raritan Bay and Chapel Hill Channels, further reducing turbidity and sedimentation in the offshore environment. Based on the above analysis, a hopper dredge would have limited application where a pre-lay process is required, may be unavailable for construction, and/or would not offer a significant environmental advantage over Transco's proposed use of an environmental clamshell dredge where applicable. For these reasons we do not recommend the hopper dredge alternative to trench across the Raritan Bay and Chapel Hill Channels.

As alternatives to the jet trencher, we considered the use of a jet sled or subsea plough to excavate the remainder of the Raritan Bay Loop trench by a post-lay method. Transco initially considered a mechanical excavator, which is similar to a trenching machine used in the onshore environment, but determined that no mechanical trenchers that could operate in waters of the U.S. were available.

A jet sled is similar to the proposed jet trencher as it also straddles the pipeline and uses a series of nozzles and pressurized sea water to emulsify the sediments, allowing the pipeline to settle beneath the seafloor under its own weight. The primary difference between the two jetting methods is that 90 percent of the sediment displaced by the jet sled would be dispersed into the water column, whereas only 5 percent of the sediment displaced by the jet trencher would be dispersed. The jet sled also trenches at a slower rate of about 76 feet per hour as compared to 246 feet per hour for the jet trencher, which would extend construction time in the offshore environment. Based primarily on these reasons, we conclude that the jet sled would not offer a significant environmental advantage over the proposed jet trencher, and do not recommend the alternative.

With similar action to an agricultural plough, a subsea plough involves passive side casting of sediments as it is pulled forward by a special pull barge or other vessel. The subsea plough is larger and heavier than the proposed jet trencher and proceeds at a slower rate of 37 feet per hour as compared to 246 feet per hour for the jet trencher, which would extend construction time in the offshore environment. The subsea plough would also result in a 30-foot-wide trench whereas the jet trencher would fluidize sediments within a 9-foot-wide area. As a result, more sediment would be displaced over a larger area by the subsea plough, and a higher percentage of the material displaced by the plough would be dispersed into the water column, increasing turbidity relative to the jet trencher. In addition, Transco does not anticipate the need to backfill the pipeline where it is installed by the jet trencher, whereas some backfill would be necessary if the subsea plough were used. Transco also noted that only one subsea plough is currently available and that it may be unable to reach sufficient trench depth to meet USACE pipeline burial depth requirements as it is configured. Based primarily on these reasons, we have determined that a subsea plough is not environmentally preferable to the proposed jet sled method and may be unavailable or unable to meet required trench depths and, therefore, do not recommend the alternative.

4.0 ENVIRONMENTAL ANALYSIS

This analysis describes the existing natural and human environment and the potential impacts on it resulting from construction and operation of the NESE Project. In the following discussion, we address geology, soils, groundwater, surface water, wetlands, vegetation, fisheries, wildlife, special status species, land use, cultural resources, air quality, and noise, as well as reliability and safety. This analysis also addresses cumulative impacts that may result when the Project's impacts are added to the impacts of past, present, and reasonably foreseeable future projects.

The environmental consequences of constructing and operating the NESE Project would vary in duration and significance. This analysis typically describes temporary, short-term, long-term, and permanent impacts. A temporary impact generally occurs during construction with the resource returning to preconstruction condition immediately after restoration or within a few months. A short-term impact could continue for up to 3 years following construction. Long-term impacts would last more than 3 years, but the affected resource would eventually recover to pre-construction conditions. A permanent impact would result from an activity that modifies a resource to the extent that it would not return to preconstruction conditions. As appropriate, our analysis also addresses direct and indirect effects and primary and secondary impacts.

Generally, our analysis identifies and describes the existing conditions of the environmental resources potentially affected by the NESE Project and, as necessary, further describes resources unique to the Project components. Transco, as part of its proposal, developed certain mitigation measures to reduce the impact of the NESE Project. As appropriate, we recommend additional measures that, if implemented, would further avoid, minimize, and mitigate potential impacts on the environment. These recommendations are also presented in section 5.2. We will recommend to the Commission that these measures be included as specific conditions in any Certificate the Commission may issue to Transco for this Project.

The conclusions in this EIS are based on our analysis of the environmental impact and the following assumptions:

- Transco would comply with all applicable laws and regulations;
- the proposed facilities would be constructed and operated as described in section 2.0 of the EIS;
- Transco would implement the mitigation measures included in its application and supplemental submittals to the FERC and cooperating agencies, and in other applicable permits and approvals; and
- Transco would comply with our recommended mitigation measures.

4.1 GEOLOGY

4.1.1 Regional Geology and Physiology

The Project facilities would occur in the Piedmont and Coastal Plain physiographic provinces. The Piedmont Province is an area of varied topography that ranges from lowlands to peaks and ridges of moderate altitude and relief. The metamorphic and igneous rocks of this province range in age from Precambrian to Paleozoic, and have been sheared, fractured, and folded. Sedimentary basins in the province contain shale, sandstone, and conglomerate of early Mesozoic age, interbedded locally with basaltic lava flows and minor coal beds, and intruded in places with diabase dikes and sills (USGS, 1997). The Coastal

Plain Province is a lowland bordered by the Atlantic Ocean to the east and the Piedmont Province to the west, and extending from Florida to Raritan Bay in New Jersey. The Coastal Plain is mostly underlain by semi-consolidated to unconsolidated clay, sand, and silt, with some consolidated beds of limestone and sandstone. Coastal Plain sediments range in age from Jurassic to Holocene, and dip and thicken toward the east (USGS, 1997). Geologic conditions in these physiological provinces are summarized in table 4.1.1-1.

TABLE 4.1.1-1

Physiographic Setting for the Northeast Supply Enhancement Project

Facility	County	Physiographic Province	Physiographic Section	Geologic Materials	Local Relief (feet)
PENNSYLVANIA					
Quarryville Loop	Lancaster	Piedmont	Piedmont Upland and Lowland	Schist, phyllite, gneiss, granitoid, limestone, conglomerate, dolostone (dolomite), and shale	101 to 300
Compressor Station 200	Chester	Piedmont	Piedmont Lowland	Dolostone (dolomite), quartzite, phyllite, and schist	0 to 100
NEW JERSEY					
Madison Loop	Middlesex	Coastal Plain	Inner Coastal Plain	Sand, clay or mud, and gravel	0 to 100
Raritan Bay Loop	Monmouth and Middlesex	Coastal Plain/ Continental Shelf	Coastal Plain/ Continental Shelf	Sand, clay or mud, and silt.	0 to 100
Compressor Station 206	Somerset	Piedmont	Piedmont Lowland	Siltstone, sandstone, shale, and diabase	0 to 100
NEW YORK					
Raritan Bay Loop	Queens and Richmond	Coastal Plain/ Continental Shelf	Coastal Plain/ Continental Shelf	Sand, clay or mud, and silt	0 to 100

Sources: NJDEP, 1990; Isachsen et al., 1991; USGS, 2015a; USGS, 2016.

4.1.2 Local Geology

4.1.2.1 Surficial and Bedrock Geology

The surficial and bedrock geology in the areas crossed by the Project was determined using information prepared by the U.S. Geological Survey (USGS), soil surveys from the National Resource Conservation Service (NRCS), Pennsylvania Geologic Survey (PAGS), PADEP, and New Jersey Geological and Water Survey (NJGWS).

Pennsylvania

Quarryville Loop and Compressor Station 200

The surficial geology between MPs 1681.0 and 1691.0 of the Quarryville Loop, including associated ancillary facilities, access roads, and contractor yards, consists of unconsolidated residuum weathered from schist and other metamorphic bedrock that occurs on hilltops and hillsides, and undistinguished colluvium and alluvium in stream valleys in the Project area. Schist bedrock may be exposed or thinly covered by residuum or colluvium on some steep slopes or uplands in the area (Sevon, 1996). Surficial geologic materials at existing Compressor Station 200 are similar to the geologic materials along the majority of the Quarryville Loop. Surficial geologic materials along the easternmost 0.4 mile of the Quarryville Loop consist of unconsolidated residuum and alluvium from the weathering and erosion of carbonate rocks (Sevon, 1996).

Paleozoic-age crystalline and sedimentary bedrock underlies all the Project facilities in Pennsylvania. The Octoraro Formation underlies the western 9.8 miles (96 percent) of the Quarryville Loop and associated ancillary facilities, access roads, and contractor yards, and is comprised of schist, phyllite, gneiss, and granitoid. The Conestoga Formation underlies the eastern 0.4 mile (4 percent) of the Quarryville Loop and is comprised of limestone, phyllite, conglomerate, dolomite, and shale. The area where the proposed compressor unit would be located at existing Compressor Station 200 is underlain by the Ledger Formation, which is comprised of dolomite. The remainder of the Compressor Station 200 site, including temporary workspace that would be used during construction, is underlain by the Antietam and Harpers Formations (undifferentiated). The Antietam Formation is comprised of quartzite, and the Harpers Formation is comprised of phyllite and schist with thin quartzite layers (USGS, 2016).

New Jersey

Madison Loop

Unconsolidated surficial deposits underlying the Madison Loop and associated ancillary facilities, access roads, and contractor yards, consist of sandy to clayey glacial till and outwash deposits from the Wisconsinan glacial event. Holocene-age sand and silty sediments deposited in near shore environments are present at the surface near the shore of Raritan Bay (USGS, 2015b).

The Holocene-age deposits beneath the Madison Loop and associated facilities overlie the Cretaceous-age Magothy Formation, which is comprised primarily of unconsolidated to partly consolidated sand in the Project area. The Magothy Formation unconformably overlies the Raritan Formation, which is similarly composed of unconsolidated to partly consolidated sand and silt. In comments on the draft EIS, the New Jersey Geological Survey (NJGS) stated that lithified bedrock units occur at depths of over 200 feet below land surface in the Project area and are likely sedimentary rocks of the Triassic Stockton Formation or pre-Mesozoic metamorphic rocks (Sugarman, et. al, 2006).

Raritan Bay Loop

Surficial and bedrock geology of the onshore segment of the Raritan Bay Loop is similar to the Madison Loop.

The offshore component of the Raritan Bay Loop is located on the continental shelf, which was affected by glaciation due to its position at the terminus of the Wisconsin continental ice sheet. The repeated emergence and submergence of the continental shelf by this glacier led to the dissection and erosion of the Cretaceous to early Tertiary Period coastal plain sediments and Quaternary Period material, resulting in glacial outwash plain sediments that rest unconformably over a sequence of pre-Wisconsin Pleistocene glaciofluvial and shallow marine units (Schwab et al., 2002).

Geologic units underlying the offshore portion of the Raritan Bay Loop are also comprised of the unconsolidated to partly consolidated Magothy and Raritan Formations (USGS, 2016).

Compressor Station 206

Transco advanced 11 geotechnical soil borings in the area where Compressor Station 206 would be constructed. These soil borings identified 5 to 15 feet of overburden comprised of clay, clayey sand, sand, and gravel overlying bedrock, where boring refusal was encountered.

The unconsolidated surficial deposits are underlain by the Jurassic-age Palisades-Rocky Hill Diabase, a dark, hard, igneous rock (USGS, 2016). The diabase was intruded into Triassic-age sedimentary rock units as a sub-horizontal tabular body referred to as a "sill," and is estimated to be over 1,000 feet thick in southern Franklin Township (USACE, 2003). The upper portion of the diabase is weathered and fractured; the degree of fracturing decreases with depth and the unweathered diabase is competent, with infrequent fracturing.

4.1.2.2 Shallow Bedrock and Blasting

The installation of 26- to 42-inch-diameter pipeline typically requires a trench depth of approximately 8 feet. In Pennsylvania, USGS Open-File Surficial Geologic Maps, Field Guides, and other reports indicate that shallow bedrock could exist along the Quarryville Loop (USGS, 1955a; 1955b; 1995; 1996; and 2002). However, bedrock was not encountered in 12 geotechnical soil borings installed to depths of 31 feet along the Quarryville Loop. As discussed in section 2.3.2.1, Transco originally considered using the HDD method to install the Quarryville Loop between MPs 1686.1 and 1686.8, but due to feasibility concerns, now proposes to install this segment using standard open cut methods. During the evaluation of the HDD method, four geotechnical borings identified metamorphic (schist) bedrock at depths of 25 to 68 feet, well below the trench depth of the Quarryville Loop. Transco also reported that geotechnical soil borings installed at existing Compressor Station 200 in 2004 identified carbonate bedrock at depths of 23 to 57 feet below ground surface. Based on the geotechnical soil boring results along the Quarryville Loop and at Compressor Station 200, it is not expected that consolidated bedrock would be encountered during construction in Pennsylvania.

In New Jersey, only unconsolidated clay, silt, sand, and gravel deposits were encountered in 21 geotechnical soil borings installed along the onshore Madison Loop between 2005 and 2017, and in 17 geotechnical soil borings and 76 vibracore soil borings installed along the proposed offshore route for the Raritan Bay Loop in 2016 and 2017. Onshore soil borings extended to a maximum depth of 157 feet and offshore soil borings extended to a maximum depth of 127 feet. Based on these results, it is not expected that consolidated bedrock would be encountered during construction of the Madison Loop or the Raritan Bay Loop.

As noted above, 11 geotechnical soil borings installed at proposed Compressor Station 206 encountered diabase bedrock at depths of 5 to 15 feet. In the geotechnical investigation report for Compressor Station 206, Geosyntec Consultants recommends foundation depths of 3 to 5 feet for the various structures at the site, which would be above the bedrock surface.

4.1.3 Mineral Resources

A review of mineral resources in the Project area was conducted using publicly available information from the NJDEP, the NJGWS, and the USGS.

Mineral resources in the Project area include sand, gravel, surficial rock, and crushed stone. Table 4.1.3-1 summarizes mineral resources operations within 0.25 mile of Project workspaces. No mineral resource operations were identified within 0.25 mile of the Quarryville Loop, Compressor Station 200, or the onshore and offshore portions of the Raritan Bay Loop.

TABLE 4.1.3-1

Mineral Resource Operations Within 0.25 Mile of the Northeast Supply Enhancement Project Facilities

Facility	Milepost (mile)	Mineral Resource(s)	Mining Operation Name	Distance/Direction from Project
NEW JERSEY				
Madison Loop	8.6	Sand, gravel, and rock recycling operation; recycled asphalt and concrete	Stavola Contracting	750 feet south
	9.7	Sand, gravel, and rock surficial mining	Whitehead Brothers	1,300 feet north
	11.3	Sand, gravel, and rock surficial mining operations	Jaybill Equipment	300 feet south
	11.6	Sand, gravel, and rock surficial mining operations	F. H. Smith	850 feet south
Compressor Station 206	N/A	Crushed stone surficial mining	Trap Rock Industries, Inc.	0.2 mile south of access road; 0.4 mile from compressor building

Sources: NJDEP & NJGWS, 2006; ESRI, 2016.

Based on Transco's field surveys and our additional review, we determined that only the Stavola Contracting and Trap Rock Industries, Inc. mining operations are still active, and the remaining mining operations near MPs 9.7, 11.3, and 11.6 of the Madison Loop have been discontinued and converted to commercial and residential use.

The Trap Rock facility is a large, active quarry where diabase bedrock is mined and processed into crushed stone, primarily for use as road base or in other construction materials. As noted in table 4.1.3-1, the nearest face of the quarry is about 0.2 mile from the proposed access road to Compressor Station 206 and 0.4 mile from the proposed compressor building. Trap Rock conducts periodic blasting within the quarry, and we received many comments expressing concern that blasting at the mine could damage Compressor Station 206 or Transco's existing Mainline pipelines in the area, causing a serious public safety incident. In section 4.11.4 we discuss the potential for blasting at the Trap Rock quarry to impact Transco's existing and proposed facilities in the area.

4.1.4 Geologic and Meteorological Hazards

Geologic and meteorological hazards are conditions or phenomena that present a potential risk to life and/or property, and can be either naturally occurring or human-induced. Geologic hazards of potential concern in the Project area include seismic hazards, steep slopes and slope instability (landslides), karst topography, and meteorological hazards include extreme storms and flooding. Section 4.12.4 includes our discussion of climate change and the Project's potential contribution to climate change.

4.1.4.1 Seismic Hazards

Seismicity refers to the frequency, intensity, and distribution of earthquakes within a given area. Earthquakes generally occur when two sides of a fault suddenly slip past each other. The movement creates ground motion, which can cause damage to properties and structures if the motion is sufficiently intense. Most earthquakes occur along boundaries of tectonic plates. The east coast of the United States is considered a passive tectonic boundary located on the trailing edge of the North American tectonic plate, which is relatively quiet. Earthquakes that do occur in the region are largely due to trailing edge tectonics and residual stress released from past orogenic events.

The Quarryville Loop is within the Lancaster Seismic Zone, the most seismically active region in Pennsylvania (USGS, 2000). The largest recorded earthquake near the Project area was a magnitude 4.4 event that occurred on April 22, 1984 near Marticville, Pennsylvania, approximately 6.7 miles northwest of the Quarryville Loop. The Marticville earthquake caused minor damage in Conestoga, Pennsylvania, including garage foundation movement, falling plaster, and cracked windows (USGS, 1992; Stover and Coffman, 1993).

The largest recorded earthquake near the Project facilities in New Jersey and New York was a magnitude 5.0 to 5.4 event that occurred on June 1, 1927 near Asbury Park, New Jersey, which is approximately 21 miles south of the Madison Loop and the Raritan Bay Loop and approximately 33 miles southeast of proposed Compressor Station 206. The Asbury Park earthquake caused minor damage including falling ceilings and chimneys and other falling objects (USGS, 1992; Stover and Coffman, 1993).

The shaking during an earthquake can be expressed in terms of the acceleration due to gravity (g). Seismic risk can be quantified by the motions experienced by the ground surface or structures during a given earthquake, expressed in terms of g. For reference, peak ground acceleration (PGA) of 10 percent of gravity (0.1 g) is generally considered the minimum threshold for damage to older structures or structures not made to resist earthquakes.

The USGS estimates there is a 2 percent chance for an earthquake to occur within the Project area in the next 50 years (i.e., a recurrence interval of 2,500 years) that would result in a PGA between 0.10 g and 0.14 g for the Project facilities in Pennsylvania (Quarryville Loop and Compressor Station 200) and between 0.14 and 0.20 g for the Project facilities in New Jersey and New York (proposed Compressor Station 206, Madison Loop, and Raritan Bay Loop) (Petersen et al., 2015). The USGS also estimates there is a 10 percent chance for an earthquake to occur in the next 50 years (i.e., a recurrence interval of 475 years) that would result in a PGA of between 0.02 g and 0.03 g for the Project facilities in Pennsylvania and between 0.03 g and 0.05 g for the Project facilities in New Jersey and New York (Petersen et al., 2015).

Large earthquakes can cause surface displacement along bedrock fault lines, but it is very rare for earthquakes to cause surface displacements generally east of the Rocky Mountains. Geologic mapping in the Project area identified ancient faults in bedrock near the eastern end of the Quarryville Loop, at and near existing Compressor Station 200, and near proposed Compressor Station 206. However, the USGS Quaternary Fault and Fold Database does not identify any of these faults, or any other faults in the Project area, as being active within the Quaternary Period, which encompasses the last 1.6 million years (USGS, 2006). The USGS considers a fault to be active if displacements have occurred along the fault in the last 10,000 years (USGS, 2008).

Soil liquefaction is a phenomenon that occurs when granular, saturated soils temporarily lose strength and liquefy (i.e., behave like a viscous liquid) when subject to strong and prolonged shaking as may occur during an earthquake. Areas susceptible to liquefaction may include soils that are generally sandy or silty and are generally located along rivers, streams, lakes, and shorelines, or in areas with shallow groundwater. Structures located on or within an area experiencing soil liquefaction could sustain damage due to loss of underlying soil strength.

The potential for soil liquefaction to occur is low based on the low seismicity of the region.

4.1.4.2 Steep Slopes and Slope Instability

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides can be initiated by heavy rainfall, earthquakes, changes in groundwater conditions (i.e., seasonal high-water tables), and/or slope disturbance resulting from construction activity. Information on landslide incidence and susceptibility rate for the Project was obtained from the USGS (USGS, 2001). All Project facilities are located in areas with low landslide susceptibility and incidence of actual landslides (less than 1.5 percent of the area is affected by landslides).

Areas of steep slopes (greater than 30 percent) and steep side slopes (greater than 30 percent) are another indicator of landslide potential. Along the Quarryville Loop, 210 feet of steep slopes and 160 feet of steep side slopes were identified, representing less than 1 percent of the pipeline length. Along the Madison Loop, 210 feet of steep slopes and 105 feet of steep side slopes were identified, representing less than 2 percent of the pipeline length. No steep slopes or steep side slopes were identified along the Raritan Bay Loop or on the sites of Compressor Station 200 or Compressor Station 206.

4.1.4.3 Karst Conditions

Karst terrain results from the dissolution of soluble bedrock, such as limestone, dolomite, marble, or gypsum, through the circulation of groundwater that has become slightly acidic due to atmospheric CO_2 being dissolved in the water. Karst terrain is characterized by the presence of sinkholes, caverns, an irregular "pinnacled" bedrock surface, and springs. Any landscape that is underlain by soluble bedrock has the potential to develop karst landforms.

As indicated in section 4.1.2, the eastern 0.4 mile of the Quarryville Loop between MPs 1690.8 and 1691.2 is underlain by the Conestoga Formation which includes limestone and dolomite, and the PAGS has identified karst terrain in this area. No obvious karst features such as sinkholes are evident on aerial photographic imagery within 0.25 mile of the Quarryville Loop, and Transco stated that the existing Mainline pipelines in this area, which were first installed over 50 years ago, have not been affected by karst activity or other geologic hazards. In 2017, Transco conducted a geophysical survey and soil boring program to further evaluate for the presence of karst features along MPs 1690.8 and 1691.2 of the Quarryville Loop. The geophysical assessment consisted of a multichannel analysis of surface waves (MASW) survey, which is effective for identifying and delineating subsurface features such as bedrock voids that could lead to ground subsidence. The results indicated that unconsolidated soils extend to a depth of 20 to 40 feet below ground surface, with a possible 40-foot-wide bedrock pinnacle extending to near the ground surface at one location. The MASW survey also indicated a bedrock profile consistent with a decreasing degree of weathering with depth; however, three small geophysical anomalies were identified that could be indicative of a subsurface void or other karst feature. Four soil borings were subsequently advanced in these areas and found that the geophysical anomalies appeared to be associated with loose sandy and silty soils and not subsurface voids. We reviewed the geophysical survey and soil boring report and found it acceptable.

Existing Compressor Station 200 is also underlain by carbonate bedrock and the facility is in an area where karst features have been identified. However, Transco stated that there are no karst features within footprints of buildings and that the facility, which was constructed over 50 years ago, has not been affected by karst activity or other geologic hazards. In 2018, Transco conducted a geophysical survey in the area of the proposed expansion at Compressor Station 200. The geophysical assessment consisted of collecting 3,000 linear feet of microgravity data along six transects in the expansion area, as well as a transect along an electric duct that would be installed on the site. This survey identified eight anomalies that could be indicative of bedrock voids, depressions, or fractures. Four of the anomalies were located along the proposed electric duct and four were identified within the compressor building expansion area. These four anomalies were attributed to bedrock fractures or bedrock depression, not a large bedrock void. We reviewed the geophysical survey report and found it acceptable.

4.1.4.4 Extreme Storms and Flooding

Hazards associated with hurricanes include storm surges, heavy rainfall, inland flooding, high winds, tornadoes, and rip currents. Hurricane intensity is measured on the Saffir-Simpson Scale and ranges from a Category 1 storm with winds from 74 to 95 mph that can produce some damage, to a Category 5 storm with winds greater than 157 mph that produce catastrophic damage (NOAA, 2013a). The Project is located in an area that the USGS anticipates will experience between 20 and 40 hurricanes during a 100-year period (USGS, 2005). Most recently, the Project area was in the path of Tropical Storm Irene and Hurricane Sandy, both of which brought intense rain and flooding to the region. Hurricane Sandy was the largest-diameter Atlantic hurricane on record and made landfall as a Category 1 storm in October 2012. The storm impacted a long swath of the Mid-Atlantic coastline, including many of the same areas impacted by Tropical Storm Irene in August 2011 (USGS, 2013).

Hurricanes could potentially affect the offshore portion of the Project located in Middlesex and Monmouth Counties, New Jersey and Richmond and Queens Counties, New York and the onshore portion of the Project located in Middlesex County, New Jersey, including the Madison Loop, and the Raritan Bay Loop. In a given year, there is a 0.1 percent chance of a hurricane making landfall in Middlesex County, New Jersey; 0.3 percent chance of a hurricane making landfall in Monmouth County, New Jersey; and a 0.4 percent chance of a hurricane making landfall in Richmond or Queens Counties, New York. The 50-year probability of a Category 3, 4, or 5 making landfall is 9.5 percent in Middlesex County, New Jersey; 6.5 percent in Richmond County, New York; 6.1 percent in Queens County, New Jersey; and less than 0.1 percent in Monmouth County, New Jersey (Klotzbach and Gray, 2012). The Quarryville Loop, Compressor Station 200, and Compressor Station 206 are located inland and are less likely to be affected by hurricanes; however, the proposed site of Compressor Station 206 is approximately 18 miles from the New Jersey coastline. Thus, the compressor station would not be affected by storm surge or other coastal flooding, but could be affected by high winds and rainfall.

The FEMA Flood Insurance Rate Map indicates that the 100-year floodplain for Carters Brook extends onto the northeastern corner of the 52.1-acre parcel on which Compressor Station 206 would be located (FEMA, 2016). The 52.1-acre parcel is situated near the top of a locally elevated area with radial surface drainage. The site is about 1,700 feet downstream from the headwater of Carters Brook, with the watershed upstream of the site encompassing approximately 375 acres. As a result, the potential for significant flooding near Compressor Station 206 is limited as indicated by the localized extent of the 100-year floodplain to the immediate vicinity of Carters Brook. The compressor station itself would be situated on uplands approximately 500 feet outside of the 100-year floodplain. No other Project facilities were identified as being within a 100-year floodplain.

4.1.5 Paleontological Resources

Paleontological resources including plant, invertebrate, and vertebrate fossils may be found in a variety of geologic formations, predominantly in sedimentary rocks, but not all sedimentary rocks are fossiliferous. Igneous and most metamorphic rocks form under conditions that do not commonly preserve paleontological resources. Transco consulted with the Pennsylvania State Museum and the New Jersey State Museum regarding identification of important or recognized fossil assemblages that may be in the Project area.

The Pennsylvania State Museum Curator indicated that the Quarryville Loop and Compressor Station 200 occur in areas underlain by Precambrian- or Cambrian-age rocks that do not contain significant paleontological resources.

The New Jersey State Museum Curator of Natural History indicated that the Cretaceous-age Raritan and Magothy Formations in proximity to the Madison and Raritan Bay Loops contain abundant fossils including amber, which is considered a significant paleontological resource. In its comments on the draft EIS, the NJGS also noted that the Raritan and Magothy Formations in the Project area contain fossil plants, mollusks, invertebrates, and dinosaur trackways and anticipates that fossil resources would be encountered during construction. The New Jersey State Museum Curator of Natural History further indicated that fossil discoveries at the proposed site of Compressor Station 206 would not be expected, though are still a possibility.

4.1.6 Impacts and Mitigation

Construction and operation of the Project would not materially alter existing geologic conditions in the area and the overall effect of the Project on topography would be minor. The primary impacts would be associated with onshore grading and excavation activities and with offshore dredging and jetting. Transco would minimize impacts by returning contours to preconstruction conditions to the maximum extent practicable. Grading and filling may be required to permanently create a safe and stable land surface to support aboveground facilities; however, these impacts would be minor and localized to the immediate area of the aboveground facilities.

Based on the results of geotechnical investigations, Transco does not anticipate the need for blasting during Project construction. Should shallow bedrock be encountered during onshore construction, Transco would attempt to use mechanical methods such as the use of conventional excavation equipment and/or ripping, to remove the bedrock. Should blasting become necessary, Transco would prepare a Blasting Plan to be filed with the FERC prior to initiating any blasting activity. As discussed in section 3.3, Transco identified boulders or other rocky substrate in some areas of the seafloor to the east of the Ambrose Channel, and routed the proposed Raritan Bay Loop, in part, to avoid these areas. Transco would incorporate a minor reroute if boulders or other rocky substrate are unexpectedly encountered in the path of the proposed loop during construction.

Two active mineral resources operations were identified within 0.25 mile of the proposed facilities. We note that Transco's existing Compressor Station 207 is partly between the Stavola Contracting facility and the Madison Loop, and that, based on Franklin Township's zoning map (Franklin Township Department of Planning and Zoning, 2017), mining at the Trap Rock quarry is not expected to expand toward proposed Compressor Station 206. Therefore, the NESE Project would not be expected to impact either mineral resource operation. Transco has further stated that it would coordinate with the mine operators to ensure that construction and operation activities would not restrict mine access or operations.

The recorded magnitude of earthquakes in the Project area is relatively low and would not pose a risk for a modern, arc-welded pipeline, and the Project would not cross any surface faults that exhibit evidence of activity within the last 1.6 million years. In a study after the Northbridge, California earthquake of January 17, 1994, which included 11 earthquakes with a magnitude of 5.8 or greater that occurred between 1933 and 1994, it was found that modern, arc-welded steel pipelines did not experience breaks or leaks as a result of either traveling ground waves or permanent ground deformation (O'Rourke and Palmer, 1996). In addition, repair statistics show that earthquake damage occurs predominantly to older pipeline welds, and that, regardless of age, the pipe welds have generally performed well. Project facilities would be constructed to meet DOT's Minimum Federal Standards outlined in 49 CFR 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, further reducing the potential for seismic-related damage to occur. These are the same regulations that govern the construction and operation of natural gas pipelines throughout the country, including areas with greater seismic hazards. Each facility would be designed and constructed to provide adequate protection from washouts, floods, unstable soils, landslides, or other hazards that could cause it to move or sustain abnormal loads. Due to the low level of seismic activity in the region and construction of the proposed facilities in accordance with current federal and industry standards, the potential for seismic hazards to impact the Project facilities is low.

The Project would be in an area with a low susceptibility and incidence of landslide activity. As state above, the proposed facilities would be constructed of modern materials in accordance with the DOT's Minimum Federal Standards presented in 49 CFR 192, which are designed to provide adequate protection from washouts, floods, unstable soils, or landslides. Pipeline installation techniques, especially padding and use of rock-free backfill, effectively insulate the pipe from minor earth movements. We conclude that construction of the proposed facilities in accordance with applicable regulations, and implementation of the measures described previously, would adequately reduce the potential for construction-related activities to trigger landslides or other slope instability.

In karst sensitive areas, the primary impact that could affect the Project pipeline and aboveground facilities is the sudden development of a sinkhole that damages the facilities and poses a safety risk. In addition, flooding within closed depressions and other karst features could pose a buoyancy concern to the pipeline facilities. Other subsidence features could develop more gradually over time, but would not pose an immediate risk to the proposed facilities. Karst features could be initiated by the physical disturbance associated with trenching, grading, or by diverting or discharging Project-related water into otherwise stable karst features. As discussed in section 4.1.4.3, and in response to our recommendation in the draft EIS, Transco provided the results of geophysical and geotechnical investigations to further assess the potential for karst activity to impact the eastern terminus of the Quarryville Loop and the planned expansion at Compressor Station 200. The additional investigation did not identify a risk for karst activity to affect the Quarryville Loop, but subsurface anomalies that could represent karst features were identified at Compressor Station 200. The additional investigation concluded that the anomalies would not pose a direct risk to building foundations, but the following measures were recommended to minimize the potential for karst activity to occur at the site:

- the compressor building should be constructed on mat foundations;
- a stormwater management system should be implemented to provide positive surface drainage away from existing and new buildings and preventing sustained ponding of surface water in construction areas and near buildings;
- stormwater infiltration should be minimized on-site; detention or retention basins should be a minimum of 200 feet from structures and downgradient from the facilities;
- porous pavement should not be used within the construction area; and
- after construction, Transco personnel should periodically inspect the grounds and notify engineering of any depressions, voids, or ponded water.

Transco has committed to implementing the above measures, which we conclude would adequately reduce the potential for karst activity to adversely affect Compressor Station 200.

There is a high probability that the coastal portions of the Project could experience hurricane-force winds and flooding. Because the pipeline loops would be installed below ground, it is unlikely that the pipeline portions of the Project would be impacted by hurricane conditions following construction; however, the proposed site for Compressor Station 206 could be affected by high winds and localized flooding. Transco would construct the facility in compliance with International Building Code and American Society of Civil Engineers 7 standards, which include detailed design and construction specifications to withstand the predicted wind speeds at the site. As discussed above, the potential for significant flooding near Compressor Station 206 is limited. To further reduce the potential for flooding to impact the facility, Transco would site the compressor station outside of the 100-year floodplain for Carter's Brook; construct building foundations 1 foot above the base flood elevation; and use hydraulic systems to operate control valves in the event of a storm-related electrical failure.

There is some potential to encounter paleontological resources during construction, particularly along the Madison Loop in New Jersey. To minimize potential impacts on significant resources, Transco would implement measures outlined in its Unanticipated Discovery Plan for Paleontological Resources (see table 2.3-3). In general, Transco EIs, construction contractors, and contractors would receive training regarding the identification and preliminary treatment of paleontological resources and work would be stopped upon discovery. The EI would then contact the State Museum of Pennsylvania Curator or the New Jersey State Curator of Natural History to determine the significance of the findings. If the decision is made to collect and save the fossils, a plan would be developed with the appropriate state scientist to properly excavate and safeguard the resource. We have reviewed the Unanticipated Discovery Plan for Paleontological Resources and find that implementation of the plan would adequately protect paleontological resources that may be encountered during construction.

In conclusion, based on the geologic and topographic setting in the Project area, and considering that Transco would be unlikely to encounter hard bedrock during construction, the overall potential for the Project to significantly impact geologic resource, or to be significantly impacted by geologic hazards and meteorological conditions, is low. These risks would be further reduced by constructing and operating the proposed facilities in accordance with applicable industry standards, regulatory requirements, Transco's Plans and Procedures, other Project-specific plans, and our recommendations.

4.2 SOILS

4.2.1 Soil Resources

We identified the types and characteristics of soils crossed by the NESE Project using NRCS soil surveys and the computerized SSURGO database for each county affected by the Project. SSURGO provides the most detailed level of information of soil mapping done by the NRCS. The Web Soil Survey was also reviewed to provide interpretations of the sensitivity of soils to specific types of disturbance and soil suitability for specific types of uses such as roads and excavations.

SSURGO data is only applicable to the onshore portions of this Project. Additional information on offshore sediment distribution and size was obtained through offshore sediment sampling and is discussed further in section 4.5.2.8. Therefore, the remainder of this section will only discuss soil impacts for the onshore portions of the NESE Project.

Based on information contained in the SSURGO database, the Project would cross about 43 individual soil map units consisting of 1 major soil type or complexes of 2 or more soil types that can contain a minor percentage (generally not more than 10 percent) of dissimilar soils. Our analysis focused on the major soil characteristics for the dominant soils within the map unit.

4.2.1.1 Soil Characteristics and Limitations

Several soil characteristics have the potential to affect, or be affected by, construction and operation of interstate natural gas transmission facilities. These include prime farmlands or farmlands of statewide importance, erosion potential, hydric soils, compaction potential, stony and rocky soils, depth to shallow bedrock, and revegetation concerns. These soil characteristics are further described in the sections below. Table 4.2.1-1 summarizes the soil characteristics (in acres) that would be impacted by construction and operation of the Project. Soils may exhibit one or more of these soil characteristics.

TABLE 4.2.1-1

Summary of Soil Characteristics Affected by Construction and Operation of the Onshore Portion of the Northeast Supply Enhancement Project (in acres) [a]

Location/Facility	Highly Water Erodible [b]		Highly Wind Erodible [c]		Hydric [d]		Compaction Prone [e]		Stony/Rocky [f]		Shallow to Bedrock [g]		Poor Revegetation Potential [h]		Prime Farmland [i]		Farmland of Statewide Importance [j]	
	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]
PENNSYLVANIA																		
Quarryville Loop																		
Pipeline Right-of-Way [l]	71.0	0.0	0.0	0.0	3.5	0.0	19.3	0.3	110.1	1.3	0.0	0.0	74.5	0.0	112.5	1.4	54.8	0.0
Access Roads	1.1	0.2	0.0	0.0	0.0	0.0	0.2	0.2	1.3	0.2	0.0	0.0	1.2	0.3	1.4	0.3	1.1	0.2
Contractor Yards	4.1	0.0	0.0	0.0	0.0	0.0	5.2	0.0	14.2	0.0	0.0	0.0	4.1	0.0	17.1	0.0	1.0	0.0
Quarryville Loop Subtotal	*76.2*	*0.2*	*0.0*	*0.0*	*3.5*	*0.0*	*24.7*	*0.5*	*125.6*	*1.5*	*0.0*	*0.0*	*79.8*	*0.3*	*131.0*	*1.7*	*56.9*	*0.2*
Compressor Station 200	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	21.5	4.2	21.5	4.2	7.5	0.0	0.0	0.0
Pennsylvania Subtotal	*76.2*	*0.2*	*0.0*	*0.0*	*3.5*	*0.0*	*32.1*	*0.5*	*125.6*	*1.5*	*21.5*	*4.2*	*101.3*	*4.5*	*138.4*	*1.7*	*56.9*	*0.2*
NEW JERSEY																		
Madison Loop																		
Pipeline Right-of-Way [l]	13.4	0.3	18.2	0.3	7.4	0.0	0.8	0.0	1.2	0.0	0.0	0.0	45.7	0.4	3.2	0.2	10.1	0.0
Access Roads	0.3	0.1	3.0	0.1	0.0	0.0	1.0	0.0	0.2	0.0	0.0	0.0	8.8	0.1	0.4	0.0	1.5	0.0
Contractor Yards	0.7	0.0	5.4	0.0	0.0	0.0	9.7	0.0	0.0	0.0	0.0	0.0	8.9	0.0	2.7	0.0	6.1	0.0
Madison Loop Subtotal	*14.4*	*0.4*	*26.6*	*0.4*	*7.4*	*0.0*	*11.5*	*0.0*	*1.4*	*0.0*	*0.0*	*0.0*	*63.4*	*0.5*	*6.4*	*0.2*	*17.7*	*0.0*
Compressor Station 206 [m]	0.0	0.0	0.0	0.0	2.3	1.8	27.2	23.3	3.6	3.6	2.4	2.4	4.7	4.2	22.5	19.1	1.1	0.6
Raritan Bay Loop (Onshore)																		
Pipeline Right-of-Way [l]	2.3	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0
Access Roads	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Contractor Yards [n]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Raritan Bay Loop (Onshore) Subtotal	*2.8*	*0.0*	*2.8*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*2.8*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
New Jersey Onshore Subtotal	*17.2*	*0.4*	*29.3*	*0.4*	*9.7*	*1.8*	*38.7*	*23.3*	*5.0*	*3.6*	*2.4*	*2.4*	*70.8*	*4.7*	*28.8*	*19.3*	*18.8*	*0.6*
Project Total (Onshore)	**93.3**	**0.6**	**29.3**	**0.4**	**13.2**	**1.8**	**70.8**	**23.9**	**130.6**	**5.1**	**23.9**	**6.6**	**172.2**	**9.2**	**167.2**	**21.1**	**75.7**	**0.8**

TABLE 4.2.1-1 (cont'd)

Summary of Soil Characteristics Affected by Construction and Operation of the Onshore Portion of the Northeast Supply Enhancement Project (in acres) [a]

	Highly Water Erodible [b]		Highly Wind Erodible [c]		Hydric [d]		Compaction Prone [e]		Stony/Rocky [f]		Shallow to Bedrock [g]		Poor Revegetation Potential [h]		Prime Farmland [i]		Farmland of Statewide Importance [j]	
Location/Facility	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]	Const.	Op. [k]

[a] Soil may have more than one characteristic.
[b] Includes soils with a slope >15% or soils with a K value of >0.35 and slopes greater >5%.
[c] Includes soils in wind erodibility group designation of 1 or 2.
[d] Includes soils that are classified as hydric by SSURGO.
[e] Includes soils in somewhat poor to very poor drainage classes with surface textures of clay loam and finer.
[f] Includes soils with a cobbley, stony, bouldery, shaly, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or that have a surface layer that contains greater than 5 percent by weight rock fragments larger than 3 inches.
[g] Includes soils identified with bedrock at a depth of 5 feet or less from the surface.
[h] Includes soils with a non-irrigated land capability classification of 3 or greater.
[i] Includes soils that meet the prime farmland or prime farmland if a limiting factor is mitigated.
[j] Includes soils classified as farmland of statewide importance by SSURGO.
[k] Construction-related impacts on soils in the pipeline right-of-way would be temporary and localized to the construction workspace and would be minimized by construction and restoration plans discussed throughout this EIS. Operational impacts reflect those from operation of the ancillary facilities. Operational impacts on the remaining soils within the pipeline right-of-way are not presented in this table.
[l] Includes the temporary and permanent pipeline rights-of-way, additional temporary workspaces, and ancillary pipeline facilities.
[m] Includes the permanent access road and suction/discharge piping.
[n] The contractor yards that would be used during construction of the Raritan Bay Loop are existing shipping yards (the Construction and Marine Equipment yard and the Weeks Marine yard); therefore, use of these facilities would be consistent with their current use.
Note: Sum of addends may not equal total due to rounding.

Erosion Potential

Erosion is a natural process generally resulting from water and wind forces that can be accelerated by human disturbance. Factors that influence the magnitude of erosion include soil texture, soil structure, length, and percent of slope, existing vegetative cover, rainfall intensity, and wind intensity.

Water Erodible

Soils most susceptible to water erosion are typified by bare or sparse vegetative cover, non-cohesive soil particles, low infiltration rates, and/or moderate to steep slopes. Soils more typically resistant to water erosion include those that occupy low relief areas, are well vegetated, and have high infiltration capacity and internal permeability. The potential for soils to be eroded by water was evaluated based on the K factor, where available, and slope. The K factor represents a relative quantitative index of the susceptibility of bare soil to particle detachment and transport by water, and is one of the factors used in the Revised Universal Soil Loss Equation to calculate soil loss. K factor values range from 0.02 to 0.69. Soils with a slope >15 percent or soils with a K value of >0.35 and slopes greater >5 percent are considered highly erodible by water.

Based on the K factor and slope designations discussed above, 93.3 acres (26 percent) of soils susceptible to water erosion would be affected by constructing the Project.

Wind Erodible

Susceptibility to wind erosion is less affected by slope angles and is more directly influenced by physical soil factors including moisture, texture, calcium carbonate content, and organic matter; and landform and landscape conditions including soil roughness factors, unsheltered distance, and vegetative cover. Wind Erodibility Groups are a direct indicator of the inherent susceptibility of soils to wind erosion. Wind Erodibility Groups may range from 1 to 8, with 1 being the highest potential for wind erosion, and 8 the lowest (NRCS, 2017). Soils with Wind Erodibility Groups of 2 or less are considered highly erodible due to wind.

Based on the Wind Erodibility Group designations discussed above, 29.3 acres (8 percent) of soils susceptible to wind erosion would be affected by constructing the Project.

Hydric Soils

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS, 2017). These soils are typically indicative of areas with a high mean water table and wetlands. However, agricultural lands can contain hydric soils that are no longer saturated due to managed hydrology practices (e.g., drain tiling or ditching) for crop development. Additionally, seasonal and climatic precipitation factors can influence water tables and soil saturation and result in soil phases where soil characteristic do not resemble hydric soils.

Based on SSURGO data, 13.2 acres (4 percent) of soils that would be affected by constructing the Project are classified as hydric soils.

Compaction Potential

Compaction occurs when soil is subjected to heavy loads or traffic. Similarly, rutting is caused by the plastic deformation of soil when subject to an external load. Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. The degree of compaction depends on moisture content and soil textures. Soils classified as having somewhat poor to very poor drainage classes and surface textures of clay loam and finer are considered to have a high potential for compaction.

Based on SSURGO data, 70.8 acres (20 percent) of soils that would be affected by constructing the Project have a high potential for compaction.

Stony/Rocky and Shallow-to-Bedrock Soils

Introducing stones and other rock fragments to surface soil layers may reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. Additionally, some agricultural equipment may be damaged by contact with large rocks and stones. Rock fragments at the surface and in the surface layer may be encountered during grading, trenching, and backfilling. Construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils.

Soils with textural classifications including stony, cobbly, gravelly, shale, slate, and droughty in any layer, or with stones larger than 3 inches in the surface layer in greater than 15 percent of the area, can be characterized as stony or rocky soil. Shallow bedrock is considered prevalent where the depth to bedrock is less than 5 feet below the ground surface.

Based on the factors discussed above, 23.9 acres (7 percent) of soils that would be affected by constructing the Project have shallow depth to bedrock; all 23.9 acres are located at Compressor Station 200 or Compressor Station 206. Additionally, constructing the Project would impact 130.6 acres (36 percent) of stony or rocky soils.

Revegetation Potential

The vegetation potential of soils is based on several characteristics including topsoil thickness, soil texture, available water capacity, susceptibility to flooding, and slope. Other considerations include whether or not the soils are natural, human transported, or disturbed. Some soils have characteristics that cause a high seed mortality. These areas may need additional management and may be difficult to revegetate. The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion, a reduction in wildlife habitat, and adverse visual impacts.

The land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time (NRCS, 2017). The land capability class ranges from 1 to 8, with 1 having the fewest limitations and 8 having very severe limitations that restrict their use for crops and pasture plants. Soils with a non-irrigated land capability classification of 3 or greater are characterized as having poor revegetation potential.

Based on the factors discussed above, 172.2 acres (48 percent) of soils with poor revegetation potential would be affected by constructing the Project.

Prime Farmland

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses; however, it does not necessarily follow that those areas are currently being used for agricultural production (the land could be cropland, pasture, woodland, or other lands). Farmland classifications are designated independently of current land use; urbanized land, built-up land, and open water cannot be designated as prime farmland as defined for the National Resource Inventories (NRCS, 2017). Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate state agencies, typically in association with local soil conservation districts or other local agencies.

The Project would impact 167.2 acres (47 percent) of prime farmland. In addition, the Project would impact 75.7 acres (21 percent) of farmland of statewide importance. Construction of the compressor stations, ancillary facilities, and permanent access roads would permanently impact 21.1 acres (13 percent) of prime farmland and 0.8 acres (1 percent) of farmland of statewide importance.

We received comments that the analysis of prime farmland did not indicate the current land use of the prime farmland soils within the Project area. This is because prime farmland is designated independently of current land use. It is NRCS policy to make and keep current an inventory of the prime farmland and unique farmland of the Nation (NRCS, 2017). Farmland classifications identify the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. However, it does not mean that the land is currently or ever has been managed under active agricultural production. Section 4.7.1 includes additional information on the impacts and proposed mitigation measures associated with current land uses within the Project area, including land used for agriculture.

Topsoil

Topsoil is the uppermost layer of soil and typically has the highest concentration of organic materials with generally greater biological productivity than subsurface soils. Microorganisms and other biological material found in topsoil, in addition to inorganic soil components, provide the bulk of the necessary nutrients to vegetation. Topsoil also has the highest concentration of plant roots and seeds. Topsoil preservation is important especially for restoration of natural vegetation and cropland as well as range or pasture lands, especially in areas where topsoil is limited in extent or depth. Topsoil thickness is the result of factors such as wetness, topography, climate, and the predominant vegetation present when the soil was being formed. Topsoil is usually compared to lower, less fertile subsurface soils commonly referred to as subsoils, below which lay sub-stratum soils containing large amounts of sand, gravel, and rock. Other factors being equal, prairie soils have more topsoil than forest soils; and wet soils have more topsoil than dry soils.

The Project would impact approximately 290.0 acres (81 percent) of soils that have topsoil depths greater than 12 inches, while 26.8 acres (7 percent) of the soils crossed have topsoil depths less than 6 inches (see table 4.2.1-2). Topsoil depths for 41.3 acres (12 percent) of soils crossed were not rated in the SSURGO database.

TABLE 4.2.1-2

Summary of Topsoil Depths and Slope Classes within the Onshore Portion of the Northeast Supply Enhancement Project (in acres)

Location/Facility	Total Acreage	Topsoil Depth (inches) [a] 0-6 inches	>6-12 inches	>12-18 inches	>18 inches	Not Rated [a]	Slope Class (percent) [b] 0-5	>5-8	>8-15	>15-30	>30	Not Rated [b]
PENNSYLVANIA												
Quarryville Loop												
Pipeline Right-of-Way [c]	188.4	0.0	0.0	0.1	188.4	0.0	11.6	105.9	53.4	12.4	5.2	0.0
Access Roads	2.6	0.0	0.0	0.1	2.5	0.0	0.1	1.4	1.1	0.0	0.0	0.0
Contractor Yards	21.2	0.0	0.0	0.0	21.2	0.0	0.0	17.1	1.0	3.0	0.1	0.0
Quarryville Loop Subtotal	*212.2*	*0.0*	*0.0*	*0.2*	*212.0*	*0.0*	*11.7*	*124.3*	*55.5*	*15.3*	*5.3*	*0.0*
Compressor Station 200	28.9	0.0	0.0	21.5	7.5	0.0	24.7	2.4	0.0	0.0	0.0	0.0
Pennsylvania Subtotal	*241.1*	*0.0*	*0.0*	*21.7*	*219.5*	*0.0*	*36.4*	*126.7*	*55.5*	*15.3*	*5.3*	*0.0*
NEW JERSEY												
Madison Loop												
Pipeline Right-of-Way [c]	50.2	0.0	0.0	14.5	15.9	19.9	16.6	2.8	11.0	0.0	0.0	19.9
Access Roads	10.2	0.3	0.0	1.4	2.4	6.2	3.8	0.3	0.0	0.0	0.0	6.2
Contractor Yards	15.3	1.7	0.0	0.0	9.7	3.9	10.6	0.7	0.0	0.0	0.0	3.9
Madison Loop Subtotal	*75.8*	*2.0*	*0.0*	*15.9*	*28.0*	*30.0*	*31.0*	*3.8*	*11.0*	*0.0*	*0.0*	*30.0*
Compressor Station 206 [d]	27.2	24.9	0.0	1.1	1.2	0.0	21.5	7.4	0.0	0.0	0.0	0.0
Raritan Bay Loop (Onshore)												
Pipeline Right-of-Way [c]	2.3	0.0	0.0	0.0	2.2	0.0	0.0	2.2	0.2	0.0	0.0	0.0
Access Roads	0.4	0.0	0.0	0.2	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Contractor Yards [e]	11.3	0.0	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	11.3
Raritan Bay Loop Subtotal	*14.1*	*0.0*	*0.0*	*0.2*	*2.6*	*11.3*	*0.0*	*2.6*	*0.2*	*0.0*	*0.0*	*11.3*
New Jersey (Onshore) Subtotal	*117.0*	*26.8*	*0.0*	*17.1*	*31.8*	*41.3*	*52.5*	*13.9*	*11.2*	*0.0*	*0.0*	*41.3*
Project Total (Onshore)	**358.1**	**26.8**	**0.0**	**38.8**	**251.3**	**41.3**	**88.9**	**140.6**	**66.7**	**15.3**	**5.3**	**41.3**

[a] Topsoil depths were calculated using the depth of the uppermost soil horizon of the dominant soil within each map unit as outlined in the SSURGO databases. Not all soil map units in the SSURGO databases have been designated a depth to the upper and lower boundaries of each soil horizon; in these cases, soils were classified as "Not Rated."

[b] Slope classes were assigned using the representative slope value of the dominant soil within each map unit as outlined in the SSURGO databases. Not all soil map units in the SSURGO databases have been designated a representative slope value; in these cases, soils were classified as "Not Rated."

[c] Includes the temporary construction workspaces, additional temporary workspaces, permanent pipeline easements, and ancillary facilities.

[d] Includes the permanent access road and suction/discharge piping.

[e] The contractor yards that would be used during construction of the Raritan Bay Loop are existing shipping yards (the Construction and Marine Equipment yard and the Weeks Marine yard); therefore, use of these facilities would be consistent with their current use

Note: Sum of addends may not equal total due to rounding.

Slope

The slope gradient of a soil influences several characteristics such as the ability of a soil to retain water and the potential for accelerated erosion or subsidence (NRCS, 2017). The slope gradient of a soil is used to assess soils with high water erosion potential and is a factor used to identify soils that may have revegetation concerns.

The Project would impact approximately 87.4 acres (24 percent) of soils that have a representative slope class greater than 8 percent, while 229.5 acres (64 percent) of the soils crossed have a representative slope class less than 8 percent (see table 4.2.1-2). Slope classification for 41.3 acres (12 percent) of soils crossed was not rated in the SSURGO database. Additional information on slopes and slope classes can be found in section 4.1.4.2.

Fragipan Soils

Fragipan soils are a naturally occurring diagnostic horizon in U.S. Department of Agriculture (USDA) soil taxonomy that can restrict soil drainage and root penetration. Improper handling of fragipan soils during excavation and backfilling has the potential to degrade agricultural productivity. In areas where NRCS soil survey information indicates a high likelihood of the presence of fragipan soils, Transco would conduct a pre-disturbance evaluation using available data and soil survey techniques.

Based on SSURGO data, the Project would impact approximately 19.7 acres (6 percent) of soils that have a fragipan layer present (see table 4.2.1-3); all these soils are located along the Quarryville Loop. SSURGO data indicates that the fragipan layers present in these soils is most likely found approximately 29 to 31 inches below the soil surface.

TABLE 4.2.1-3

Summary of Fragipan Soils within the Onshore Portion of the Northeast Supply Enhancement Project (in acres)

Location/Facility	Const.	Op. [b]
Pennsylvania		
Quarryville Loop		
Pipeline Right-of-Way [a]	14.4	0.3
Access Roads	0.1	0.1
Contractor Yards	5.2	0.0
Quarryville Loop Subtotal	*19.7*	*0.5*

[a] Includes the temporary and permanent pipeline rights-of-way, additional temporary workspaces, and ancillary facilities.
Note: Sum of addends may not equal total due to rounding.

4.2.1.2 Contaminated Soils

Soil contamination from residences, underground storage tanks, buried trash, unidentified oil or gas lines, or other sources can be encountered during construction. Transco conducted a database search to identify locations with potential and/or actual sources of contamination that may be encountered by construction of the Project. There are known sites of contaminated soil within 0.25 mile of the Madison Loop, the onshore portion of the Raritan Bay Loop, and Compressor Station 206. The database search did not locate any known, contaminated sites within 0.25 mile of the Quarryville Loop or Compressor Station 200. Additional discussion of contaminated sites can be found in section 4.7.8.

4.2.1.3 Impacts and Mitigation

Construction activities, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment along the right-of-way may affect soil resources. Clearing removes protective vegetative cover and exposes the soil to the effects of wind and rain, which increases the potential for soil erosion and sedimentation of sensitive areas. Grading, spoil storage, and equipment traffic can compact soil, reducing porosity and increasing runoff potential. Excess rock or fill material brought to the surface during trenching operations could hinder the restoration of the right-of-way. In areas of forest where the vegetation would change on the permanent right-of-way after construction, the continued formation and weathering of soil would change over the life of the Project. In other areas of cropland, pasture, residential developments, or other open areas, the right-of-way would revert to its former use after construction.

General Mitigation Measures

In general, Transco would reduce soil impacts by limiting the area of disturbance to the area needed for safe construction of the proposed facilities; co-locating the workspace with previously disturbed areas where possible; initiating restoration as soon as reasonably possible after final grading; and utilizing existing roads for temporary and permanent access to the extent possible. Transco would further minimize impacts on soil resources by constructing and operating the Project in accordance with the construction and restoration plans identified in table 2.3-3 and discussed throughout the EIS. The general measures applicable to soils management include:

- Removing topsoil from the full work area in cultivated or rotated cropland and managed pastures; residential area; hayfields; or other areas at the landowner or land-managing agency's request. At least 12 inches of topsoil would be removed in areas of deep topsoil and every effort would be made to segregate the entire topsoil layer in soils with less than 12 inches of topsoil. Topsoil piles would be segregated from subsoil throughout construction and would be stabilized with sediment barriers, mulch, temporary seeding, tackifiers, and functional equivalents, where necessary.

- Installing temporary erosion control devices within the trench and workspace immediately after initial disturbance of the soil and maintaining the devices throughout construction until replacement by permanent controls or completion of restoration. Temporary and permanent controls may include slope breakers, trench plugs, sediment barriers, and mulch. Slope breakers would break the slope length and direct runoff from the disturbed right-of-way to reduce erosion. Trench plugs would prevent water from flowing along the pipeline and key the pipeline into the adjacent undisturbed soil and rock to provide stability to the pipeline and slope.

- Implementing measures to reduce wind erosion and control dust such as applying water to work areas, reducing vehicle speeds on unpaved surfaces, covering haul trucks in transit, and using gravel at paved road access points, as needed.

- Managing fuel and other hazardous materials in accordance with applicable regulations designed to prevent inadvertent spills and implementing specific measures to limit and cleanup any spills that occur, as well as managing pre-existing soil contamination, if encountered.

- Conducting trench dewatering in a manner that does not cause erosion and in accordance with state and federal permit requirements, where applicable.

- Segregating the top 12 inches of topsoil from the area of the trench in wetlands, except where standing water is present or soils are saturated.

- Using low-ground-weight equipment in areas of standing water or saturated soils in wetlands, or using timber riprap or similar supports to support construction equipment in wetlands or other areas prone to compaction or rutting.

- Testing topsoil and subsoil for compaction at regular intervals in agricultural and residential areas. Severely compacted soils in agricultural areas would be plowed with a paraplow or other deep tillage equipment. The subsoil would be plowed in areas where topsoil has been segregated prior to topsoil replacement. Appropriate soil compaction mitigation would also be conducted in severely compacted residential areas.

- Controlling rock generated during blasting operations, if blasting is necessary. Where necessary, excess rock would be hauled off to an approved disposal location or used as beneficial reuse, per landowner or land management agency approval and as required by permit requirements.

- Using excavated rock to backfill the trench only to the top of the existing bedrock profile. Excess rock would be considered construction debris unless approved for use on the right-of-way by the landowner or land-managing agency. Excess rock would also be removed from the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, residential areas, and other areas at landowner request. The size, density, and distribution of rock within the restored right-of-way would be similar to adjacent areas.

- Seeding disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or the request of the landowner or land management agency, except in cultivated croplands unless requested by the landowner. Disturbed soils would be seeded within 6 working days of final grading, weather and soil conditions permitting, in the absence of written recommendations from the local soil conservation authorities.

- Fertilizing and adding soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land-managing agencies, or landowner. The recommended soil pH modifier and fertilizer would be incorporated into the top 2 inches of soil as soon as practicable after application.

We received comments inquiring about the success of the general mitigation measures that would be utilized to reduce impacts on prime farmland soils. To reduce soil impacts, Transco would adhere to the measures outlined in its Plan and Procedures, some of which are summarized above. As explained in section 2.3, Transco's Plan and Procedures very closely follow construction practices and mitigation measures developed by the FERC staff over years of experience in monitoring the construction and restoration of tens of thousands of miles of interstate natural gas pipeline facilities across the United States. In our experience, adherence to these Plans and Procedures ensure the successful restoration of areas affected by construction of these facilities. In addition, Transco has developed an Agricultural Construction and Monitoring Plan that outlines additional procedures Transco would implement to further avoid or mitigate impacts on agricultural lands during construction and operation of the Project. Additional information on the soil preservation measures that would by employed in areas under active agricultural production can be found in section 4.7.1.1. Following construction, Transco would implement the restoration practices outlined in its Agricultural Construction and Monitoring Plan. Agricultural lands would be restored within the permanent right-of-way and uses would continue as before construction. As part of its Agricultural Construction and Monitoring Plan, Transco has also established a toll-free number that can be used for 3 years following construction to report any agricultural issues observed by a landowner on their property.

Agricultural Land

In addition to prime farmland soils and other important farmland soils, no-till farms have been identified along the Project route. No-till farming is a management technique where crops are produced with limited or no tilling in an effort to reduce soil erosion. This land management technique can provide additional benefits to a soil's health, such as increased organic matter content and greater porosity. Section 4.7.1.1 provides additional discussion of Project impacts on agricultural land, including no-till farms.

Construction of the Project would disturb soil conditions and impact some of the accumulated benefits for soils under no-till farming management. In areas where no-till farming is practiced, additional soil amendments and cover crops would be used during restoration to help improve soil structure and organic matter as quickly as possible.

Soil Contamination

In the event that suspected contaminated soil or groundwater is encountered during construction, Transco would implement its Unanticipated Discovery of Contamination Plan, which we have reviewed and find acceptable. Measures to identify and mitigate encountered contaminated soils include:

- training of contractor personnel and EIs to identify potential contamination;
- stopping excavation in the area of potential contamination and immediately contacting a Chief Inspector, EI, or District Manager;
- placing potentially contaminated soils on, and covering with, an impervious surface (such as plastic sheeting) or placing contaminated materials in an appropriate container to prevent the spread of further contamination;
- implementing measures to ensure rainwater does not enter the trench and restricting trench dewatering activities;
- testing the media to determine contamination type and concentrations, if found;
- notifying the appropriate federal, state/commonwealth, and local agencies of the contamination; and
- disposing of contaminated soil at an approved disposal facility, when necessary.

We received comments inquiring about the success of the proposed mitigation measures that would be implemented if contaminated soils are encountered. As summarized above and detailed in its Unanticipated Discovery of Contamination Plan, Transco would implement measures to prevent the spread of pre-existing contamination if discovered during construction and would manage contaminated media in accordance with appropriate regulations. In addition, in the draft EIS we recommended that Transco provide a Materials and Waste Management Plan for segments of the Madison Loop with an increased potential to encounter pre-existing contamination. Transco provided the requested plan which further details how Transco would recognize, assess, and manage pre-existing contamination if encountered during construction of the Madison Loop (see section 4.7.8).

Acid Forming Soils

We received comments expressing concern that acid-forming soils may be present along the Madison Loop and the onshore segment of the Raritan Bay Loop, and that vegetation restoration in such soils would be difficult. Transco reported that it has not encountered evidence of acid-producing soils (e.g., poor vegetative cover) along its permanent right-of-way adjacent to the proposed Project loops. Transco provided its Soil Erosion and Sediment Control Plans for the Madison Loop and onshore segment of the Raritan Bay Loop the Freehold Soil Conservation District, which included an Acid Producing Soils Control Plan that has been approved by the District.

Transco identified the measures summarized below from its Acid Producing Soils Control Plan that it would utilize to manage high acid-producing soils. We reviewed the measures in Transco's plan and find them acceptable.

- Limiting the excavation area and soil exposure time when high acid-producing soils are encountered.

- Storing topsoil stripped from the site separately from excavated high acid-producing soils to prevent topsoil contamination.

- Daily cleaning of all equipment used to handle high acid-producing soils to prevent spreading of high-acid materials to other parts of the Project area or off-right-of-way areas.

- Installing non-vegetative erosion controls (stone tracking pads, strategically placed limestone check dams, silt fences, wood chips) to limit the movement of high acid-producing soils from around, or off site.

- Monitoring the area for approximately 6 to 12 months after top soiling and seeding to ensure there is adequate stabilization and that no high-acid soil problems emerge.

- Monitoring locations where high acid-producing soils have been placed or buried for at least 2 years to verify that no acid leachate has migrated off site.

4.2.1.4 Conclusions

Construction-related impacts on soils would be temporary and localized to the construction workspace, except for events where erosion may affect adjacent areas. We conclude that small, localized, and temporary impacts on soil resources could occur; however, the impacts would be minimized to less than significant levels and mitigated through implementation of the measures in Transco's construction and restoration plans.

4.3 WATER RESOURCES

4.3.1 Groundwater Resources

4.3.1.1 Regional and Local Aquifers

An aquifer is a water-bearing geologic unit of rock or unconsolidated material that is capable of providing groundwater to wells and springs. An aquifer is said to be confined when the hydraulic pressure in the aquifer is greater than atmospheric pressure due to the presence of confining layers above and below the water-bearing formation, whereas the hydraulic pressure in an unconfined aquifer is equal to the atmospheric pressure. Unconfined aquifers typically occur nearer to the ground surface where the water level can be more rapidly influenced by weather and surface water features, and water quality can be more readily impacted by land use activities. The upper surface of saturation in an unconfined aquifer is referred to as the “water table.” Aquifers can occur in systems that are typically comprised of at least two aquifers that are vertically stacked and hydraulically connected, such that their groundwater flow systems function in the same fashion and a change in conditions in one aquifer affects the other, depending on the degree of hydraulic connectivity (USGS, 1997).

Table 4.3.1-1 identifies the major groundwater aquifers crossed by the proposed pipeline loops and located at existing and proposed compressor stations associated with the Project. Groundwater resources would be similar for the ancillary facilities, contractor yards, and access roads associated with the pipeline loops and aboveground facilities.

TABLE 4.3.1-1

Major Aquifers Crossed by the Northeast Supply Enhancement Project

State/Facility	Milepost	Physiographic Province	Regional Aquifer	General Geologic Characteristics	Water Depth (feet)	Well Depth (feet)	Well Yield (gpm)
PENNSYLVANIA							
Quarryville Loop	1681.0 – 1690.2	Piedmont	Crystalline Aquifer	Consolidated crystalline, igneous and metamorphic rocks	0 – 125	15 – 1,000	0.3 – 300
	1690.2 – 1691.2	Piedmont	Carbonate Aquifer	Consolidated limestone and dolomite	0 – 290	7 – 820	6 – 1,100
Compressor Station 200	NA	Piedmont	Carbonate Aquifer	Consolidated limestone and dolomite	0 – 135	16 – 705	0.3 – 1,810
NEW JERSEY							
Madison Loop and Onshore Segment of the Raritan Bay Loop	8.6 – 12.2	Coastal Plain	Potomac-Raritan-Magothy Aquifer	Unconsolidated sediments	17 – 109	21 – 1,800	500 – 1,000
Compressor Station 206	NA	Piedmont	Diabase Aquifer	Consolidated igneous rock	8 – 200	<200	<25
NEW JERSEY AND NEW YORK							
Offshore Segment of the Raritan Bay Loop	12.2 – 35.5	Coastal Plain	Potomac-Raritan-Magothy Aquifer	Unconsolidated sediments	200 – 1,000	NA	NA

Sources: USGS, 2003; Fleeger et al., 2004; Ervin et al., 1994; Pucci et al., 1994; Somerset County, 2015; Trapp and Horn, 1997.

Key:

gpm = gallons per minute.

NA = Not Applicable.

As described in section 4.1.2.1, 96 percent of the Quarryville Loop crosses crystalline bedrock comprised of metamorphic schist of the Octoraro Formation. Geotechnical soil borings indicate that the bedrock is overlain by at least 31 feet of unconsolidated residuum derived from the weathering of the bedrock. The residuum and fractures in the crystalline bedrock serve as the principal places for groundwater storage, and groundwater movement is generally along short flow paths from interstream recharge areas to the nearest waterbody (USGS, 2003). Groundwater from wells completed in the crystalline aquifer is generally suitable for drinking, with total dissolved solid (TDS) concentrations averaging about 120 milligrams per liter (mg/L) and average hardness of 63 mg/L. In 1985, about 37 million gallons of water per day (mg/d) was obtained from crystalline aquifers in Pennsylvania, the majority of which was used for domestic and commercial supplies (USGS, 2003).

The remaining 4 percent of the Quarryville Loop and existing Compressor Station 200 are underlain by carbonate bedrock comprised of limestone and dolomite of the Conestoga Formation and Ledger Formation, respectively. Geotechnical soil borings indicate that the bedrock is overlain by at least 23 feet of unconsolidated residuum and colluvium at these locations. The carbonate aquifers have virtually no primary porosity or permeability; water in these rocks moves through secondary openings that have been enlarged by dissolution (USGS, 2003). Groundwater from wells completed in the carbonate aquifer is generally suitable for drinking, averaging about 330 mg/L TDS with an average hardness of 280 mg/L, which is considered very hard. In 1985, about 65 mg/d was obtained from carbonate aquifers in Pennsylvania, the majority of which was used for public supply (USGS, 2003).

In New Jersey, the Madison Loop and Raritan Bay Loop are underlain by the Cretaceous-age Magothy Formation, comprised primarily of unconsolidated silt and sand. The Magothy Formation, together with and underlying Raritan and Potomac Formations, form the Potomac-Raritan-Magothy (PRM) aquifer system, which includes some of the most productive and extensive aquifers in the Coastal Plain of New Jersey (USGS, 1994). The PRM aquifer system outcrops in central New Jersey but dips easterly and is overlain by up to 50 feet of Holocene-age alluvial deposits and beach sand and gravel near the Madison and Raritan Bay Loops. Extensive groundwater withdrawals from the upper portion of the PRM aquifer system between 1966 and 1976 led to water-level declines of 1.5 to 2.5 feet per year. Extensive use of the PRM aquifer system continued and, in 1983, more than 220 mg/d of groundwater was being withdrawn from the PRM aquifer system in coastal New Jersey for public, industrial, commercial, and agricultural use. Saltwater has intruded inland in the upper portion of the PRM aquifer system, and the water is unsuitable for consumption in some locations (EPA, 2010). The majority of fresh groundwater withdrawn from the PRM aquifer system now originates from the middle PRM unit and averages 5 to 20 mg/d in the Project region.

The uppermost bedrock unit at the Compressor Station 206 site is the Palisades-Rocky Hill Diabase, a Jurassic-age, fine-grained igneous rock. The diabase was intruded into Triassic-age sedimentary rock units as a sub-horizontal tabular body referred to as a "sill," and is estimated to be over 1,000 feet thick in southern Franklin Township (USACE, 2003). The upper portion of the diabase is weathered and fractured. The degree of fracturing decreases with depth and the unweathered diabase is competent, with infrequent fracturing. Groundwater in the diabase aquifer moves along these fractures and other joints that do not readily store or transmit water. On a scale of A to E with A being the most productive, the NJDEP ranks wells completed in the diabase aquifer as "E," indicating yields of less than 25 gpm (Greene, 2008). Transco advanced 11 geotechnical soil borings in the area where the compressor station would be constructed and identified 5 to 15 feet of unconsolidated clay, clayey sand, sand, and gravel overlying bedrock, where boring refusal was encountered. Groundwater was not reported in any of the geotechnical borings. Transco also installed six environmental soil borings on the northern portion of the Compressor Station 206 site, outside of the construction workspace. The environmental borings identified 6.5 to 11.5 feet of sand and silt above bedrock, where boring refusal was encountered. Water was observed at a depth of 8 feet in one environmental boring, but this appeared to be an isolated occurrence as water was not reported in other borings in the same area.

4.3.1.2 Sole Source Aquifers

The EPA defines a sole source or principal aquifer source area as one that supplies more than 50 percent of drinking water consumed in the area overlying the aquifer and where there are no alternative water sources available that would physically, legally, and economically supply the drinking water for all those who rely on it (EPA, 2017a).

The Madison Loop and onshore portion of the Raritan Bay Loop are within the New Jersey Coastal Plain Aquifer System sole source aquifer, and proposed Compressor Station 206 is within the Northwest New Jersey sole source aquifer, formerly known as the 15 Basin Aquifer sole source aquifer (EPA, 2017b).

The New Jersey Coastal Plain Aquifer System sole source aquifer includes Monmouth, Burlington, Ocean, Cumberland, and Cape May Counties, and portions of Mercer and Middlesex Counties, New Jersey (EPA, 2010). The PRM aquifer is the most widely utilized aquifer within the New Jersey Coastal Plain Aquifer System. The New Jersey Coastal Plain Aquifer System supplies approximately 75 percent of the drinking water for the approximately 3 million residents in the region and provides between 75 and 97 mg/d for industrial and commercial use and between 11 and 50 mg/d for agricultural use (EPA, 2010).

The Northwest New Jersey sole source aquifer is comprised of 15 separate aquifers delineated by drainage basin divides, streams that serve as discharge points, and other factors. Compressor Station 206 is within 1 of these 15 aquifer areas referred to as the South Branch Raritan River Basin Aquifer System (EPA, 1988). The 15 aquifers together encompass over 1,735 square miles in New Jersey, including all or portions of Hunterdon, Mercer, Morris, Passaic, Somerset, Sussex, and Warren Counties.

4.3.1.3 State-Designated Aquifers

Individual states may enact regulations protecting significant water recharge areas where excessive use of groundwater poses a threat to the long-term integrity of a water-supply source, or preservation areas to protect natural resources including public water supply sources. The Project does not cross any state-designated aquifers.

4.3.1.4 Water Supply Wells and Springs

Water supply wells and springs within 150 feet of the Project construction workspace were identified using data from the PADEP, correspondence with the PADEP and the NJDEP, and landowner consultations (see table 4.3.1-2).

As indicated in table 4.3.1-2, 64 private domestic water supply wells, 2 public transient non-community water supply wells, 4 private springs/artesian wells, 2 geothermal wells, and 1 livestock well were identified within 150 feet of the construction workspaces in Pennsylvania. No public or private supply wells or springs were identified within 150 feet of the Project in New Jersey or New York. Based on landowner consultation and information from public officials in Pennsylvania, Transco determined that 7 private water supply wells and 4 springs/artesian wells are within proposed workspaces, and an additional 6 private water supply wells are within 10 feet of Project workspaces. Transco also determined that the three private water supply wells within 150 feet of Compressor Station 200 workspaces are within the fence line of the facility. Transco continues to consult with landowners and public officials to more precisely locate water supply wells that could be impacted by the NESE Project (see section 4.3.1.8).

TABLE 4.3.1-2					
Public and Private Water Supply Wells and Springs Within 150 Feet of the Construction Work Area for the Northeast Supply Enhancement Project					
State/Facility	Nearest Milepost	Township	County	Well Type	Well Depth (feet)
PENNSYLVANIA					
Quarryville Loop					
	1,682.0	Drumore	Lancaster	Non-public Spring	ND
	1,682.3	Drumore	Lancaster	Non-public Spring	ND
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	130
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	ND
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	ND
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	ND
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	ND
	1,682.6	Drumore	Lancaster	Non-public Domestic Well	ND
	1,682.7	Drumore	Lancaster	Non-public Domestic Well	ND
	1,683.0	Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.5	East Drumore	Lancaster	Public, Transient Non-Community Well	ND
	1,685.5	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.5	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,685.6	East Drumore	Lancaster	Non-public Livestock Well	ND
	1,685.7	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.0	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.0[a]	East Drumore	Lancaster	Public, Transient Non-Community Well	ND
	1,686.1	East Drumore	Lancaster	Non-public Artesian Spring/Well	ND
	1,686.2	East Drumore	Lancaster	Non-public Domestic Well	ND
	1.686.2	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.2	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3[a]	East Drumore	Lancaster	Public, Transient Non-Community Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well/Geothermal	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1.686.3	East Drumore	Lancaster	Non-public Domestic Well	208
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	200
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	140
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	125
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	310
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	208
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	123
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	290
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	83
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND

TABLE 4.3.1-2 (cont'd)

Public and Private Water Supply Wells and Springs Within 150 Feet of the Construction Work Area for the Northeast Supply Enhancement Project

State/Facility	Nearest Milepost	Township	County	Well Type	Well Depth (feet)
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	228
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.3	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.4	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.4	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.4	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.5[a]	East Drumore	Lancaster	Public, Transient Non-Community Well	ND
	1,686.5	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.5	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.7[a]	East Drumore	Lancaster	Public, Transient Non-Community Well	ND
	1,686.7	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,686.7	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,688.8	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,689.3	East Drumore	Lancaster	Non-public Artesian Spring/ Well	ND
	1,689.4	East Drumore	Lancaster	Non-public Domestic Well	103
	1,689.4	East Drumore	Lancaster	Non-public Domestic Well	ND
	1,689.4	East Drumore	Lancaster	Non-public Domestic Well	100
	1,690.9	Eden	Lancaster	Non-public Domestic Well	ND
	1,691.0	Eden	Lancaster	Non-public Domestic Well	ND
Compressor Station 200					
	N/A[b]	Whiteland	Chester	Non-public Domestic Well	ND
	N/A[b]	Whiteland	Chester	Non-public Domestic Well	ND
	N/A[b]	Whiteland	Chester	Non-public Domestic Well	ND

[a] These four entries have common owners and appear to represent one public water supply well.

[b] Well is located within the fence line of Compressor Station 200.

N/A = Not applicable.

ND = No data.

Sources: Pennsylvania Groundwater Information System (PaGWIS) (PADEP, 2017b); NJDEP, 1990; Isachsen et al., 1991; USGS, 2015a; USGS, 2016.

4.3.1.5 Wellhead and Aquifer Protection Areas

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and to assess and prevent contamination of groundwater and surface water through a watershed assessment approach. A Wellhead Protection Area (WHPA) encompasses the area around a public drinking water well where contaminants could enter and pollute the well. The Raritan Bay Loop does not cross designated WHPAs in New Jersey or New York and is not discussed below.

Pennsylvania

WHPAs in Pennsylvania are divided into three zones:

- Zone I surrounds a public water supply well and has a radius of 100 to 400 feet depending on site-specific source and aquifer characteristics.
- Zone II is typically defined as the area within 0.5 mile of a public water supply well and represents the region that directly contributes groundwater to a public water supply well during pumping.
- Zone III includes the remaining drainage area contributing surface water and groundwater beyond Zone II (Pennsylvania Code, 2010).

Transco reviewed state databases and contacted state and local agencies and well owners to identify WHPAs within 1 mile of Project facilities. Well coordinates were obtained for six public water supply wells; however, mapping depicting the WHPA around each well was not obtained. Therefore, Zone I boundaries were assumed by using the more conservative 400-foot radius around each well. Zone II boundaries were estimated by using a 0.5-mile radius around public water supply well coordinates, when available, or around property parcels when precise coordinates were not available. Zone III WHPAs are site-specific and were not identified by Transco.

Table 4.3.1-3 summarizes WHPAs crossed by Project facilities in Pennsylvania. The Quarryville Loop would cross Zone I WHPAs for 3,340 feet (0.6 mile) and Zone II WHPAs for 25,803 feet (4.9 miles). Construction and operation of the pipeline loop in Zone I and II WHPAs would impact 106.9 acres and 14.7 acres, respectively. Construction and operation at Compressor Station 200 would occur within a Zone II WHPA, impacting 25.5 acres and 4.2 acres, respectively. All of the proposed facilities in Pennsylvania represent an expansion of Transco's existing system, which has operated within the WHPAs crossed for over 60 years.

New Jersey

WHPAs in New Jersey are divided into three tiers, based on the time of travel for groundwater to reach a well that is pumping at a steady rate:

- Tier 1 is the area bound by a line equivalent to a 2-year time of travel.
- Tier 2 is the area beyond Tier 1, bound by a line equivalent to a 5-year time of travel.
- Tier 3 is the area beyond Tier 2, bound by a line equivalent to a 12-year time of travel (Spayd and Johnson, 2003).

TABLE 4.3.1-3 **Wellhead Protection Areas within 0.25 Mile of the Northeast Supply Enhancement Project**					
State/Facility/Zone/Tier	Milepost Begin	Milepost End	Crossing Length (feet)	Cons. (acres)	Oper. (acres)
PENNSYLVANIA					
Quarryville Loop					
Zone I	1685.4	1685.5	3,340	106.9	14.7
	1685.9	1686.1			
	1686.4	1686.8			
Zone II	1681.0	1681.3	25,803		
	1682.3	1684.2			
	1685.0	1685.4			
	1685.5	1685.9			
	1686.1	1686.4			
	1686.8	1687.2			
	1689.0	1690.1			
Compressor Station 200					
Zone II	NA	NA	NA	25.5	4.2
NEW JERSEY					
Madison Loop					
Tier 1	11.3	11.7	1,938	14.2	0.5
Tier 2	11.1	11.3	1,966		
	11.7	11.8			
Tier 3	10.8	11.1	1,659		
	11.8	11.9			

NA = Not applicable.

Table 4.3.1-3 summarizes WHPAs crossed by Project facilities in New Jersey based on geospatial data available from the NJDEP. The Madison Loop would cross Tier 1 WHPAs for 1,938 feet (0.4 mile), Tier 2 WHPAs for 1,966 feet (0.4 mile), and Tier 3 WHPAs for 1,659 feet (0.3 mile). Construction and operation of the pipeline loop in WHPAs would impact 14.2 acres and 0.5 acre, respectively. All of the proposed facilities in New Jersey represent an expansion of Transco’s existing system, which has operated within the WHPAs crossed for over 60 years.

4.3.1.6 Pre-existing Contaminated Groundwater

As discussed in section 4.7.8, various resources were accessed to identify sites in the NESE Project area with previously documented soil and groundwater contamination that could be encountered during construction of the Project.

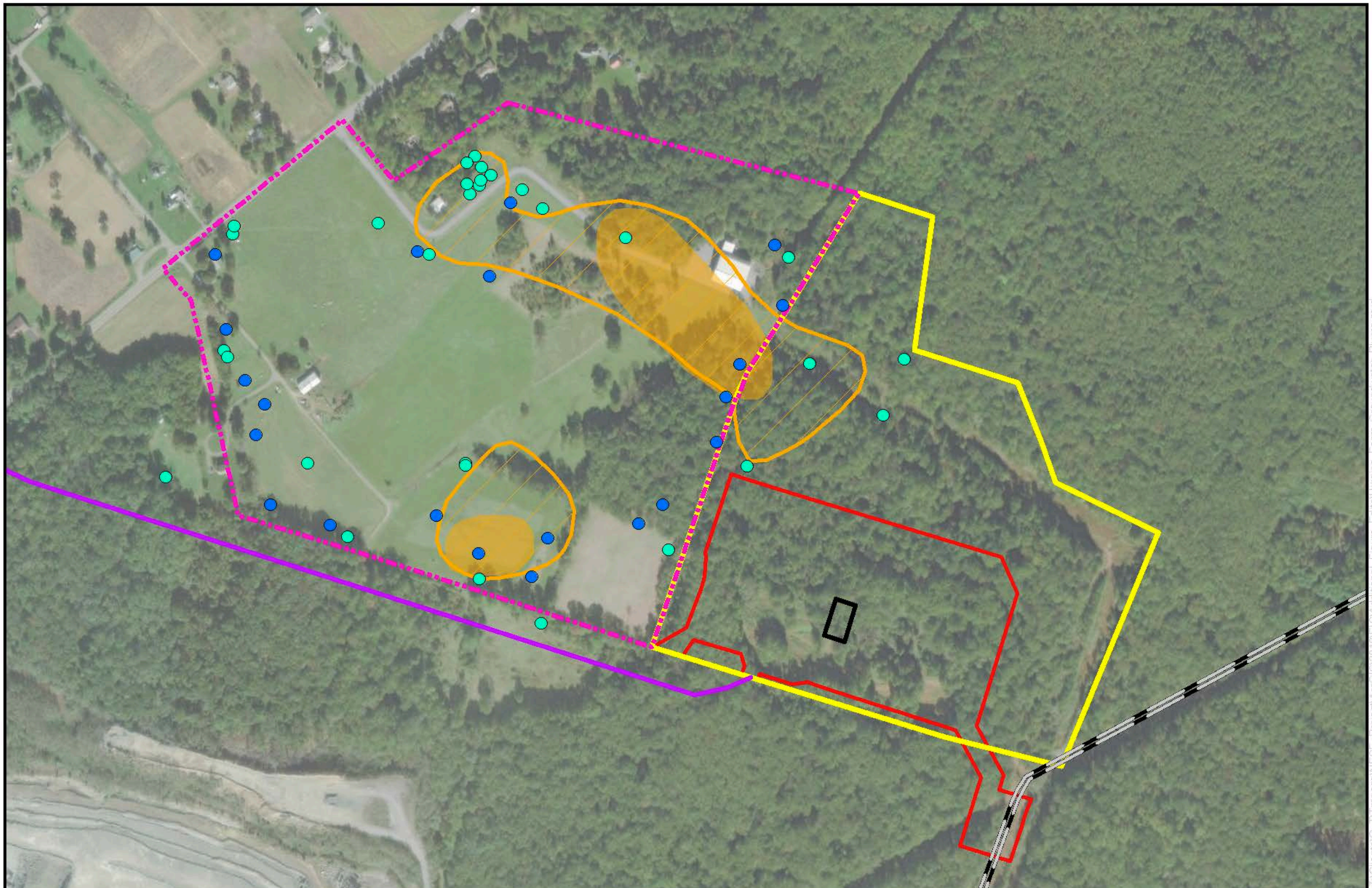
In summary, it is not expected that pre-existing contamination would be encountered during construction of the Project facilities in Pennsylvania. In New Jersey, seven contaminated sites were identified within 0.25 mile of the Madison Loop; therefore, contaminated groundwater could be encountered within trench depth during construction of the Madison Loop. More specifically, Transco managed trench dewatering of potentially contaminated groundwater during recent pipeline construction associated with the New York Bay Expansion Project (Docket No. CP15-527) between MPs 10.0 and 10.4 of existing LNYBL Loop C, an area where the Madison Loop would also be constructed. As discussed in section 4.7.8.3, Transco provided an Unanticipated Discovery of Contamination Plan that describes how contaminated media would be recognized during construction and specifies the steps that would be implemented to assess and respond to the contamination. We reviewed the Unanticipated Discovery of

Contamination Plan and find that implementation of the plan would avoid or adequately minimize potential impacts associated with handling unanticipated, pre-existing, contamination. In the draft EIS we recommended that Transco file an updated Materials and Waste Management Plan that anticipates encountering contaminated groundwater along the Madison Loop and details the specific measures, including regulatory coordination that Transco would take to properly manage contaminated groundwater. Transco provided the plan as requested and we find that implementation of the plan would ensure that previously contaminated media would be managed appropriately.

We received comments expressing concern about the potential to encounter contaminated groundwater associated with the Higgins Farm Superfund site during construction of Compressor Station 206, and that construction and operation of the compressor station, including stormwater and sanitary waste management, could exacerbate existing groundwater contamination or adversely affect the EPA's ongoing remediation at the Higgins Farm site.

The Higgins Farm site is located west and adjacent to the 52.1-acre site on which Compressor Station 206 is proposed (see figure 4.3.1-1). Contaminated soil and drums were removed from the site in 1992, and subsequent soil and groundwater sampling identified volatile organic compounds (VOCs) and metals as the primary contaminants of concern at the site. The EPA implemented enhanced in-situ bioremediation and a groundwater extraction and treatment system to reduce contaminant concentrations and minimize further contaminant migration, in addition to a well restriction to prevent the use of contaminated groundwater in the affected area (EPA, 2018). The EPA's groundwater remediation system was installed in 1998 and originally included 20 extraction wells, but 15 of the extraction wells were subsequently found to provide minimal VOC removal and were closed. Extracted groundwater is conveyed to an enclosed facility on the north end of the site where it is treated and then discharged to a pond that eventually flows into Carter's Brook. The EPA tests the discharge to Carter's Brook annually. The groundwater monitoring well network currently includes 10 overburden wells and 13 bedrock wells, including 4 multi-level wells on the Compressor Station 206 site. Groundwater occurs in two separate hydrogeologic units beneath the site: unconsolidated clay, silt, and sand that ranges from 3 to 16 feet thick on the Higgins Farm site; and the diabase bedrock aquifer described in section 4.3.1.1. Water level measurements indicate little potentiometric difference between wells completed in the bedrock aquifer and wells completed in the overburden. Groundwater flow generally follows topography under non-pumping conditions and is toward the south and southeast (towards Compressor Station 206).

The EPA has been conducting groundwater sampling at the site since 1990 and currently samples individual wells on an annual or semi-annual basis. As documented in semi-annual reports, VOC concentrations in groundwater are generally decreasing over time, and have significantly degraded in the bedrock aquifer downgradient of bioremediation injection sites. EPA indicates that several bedrock sampling locations that previously contained VOC concentrations above NJDEP Groundwater Quality Standards (GWQS) now contain only trace levels of these contaminants, and meet the GWQS. Figure 4.3.1-1 depicts the extent of 5 micrograms per liter (μg/L) of perchloroethylene (PCE), one of the primary VOCs of concern, in the bedrock aquifer in March 2013 and September 2015. The NJDEP GWQS for PCE is 1 μg/L. The 2015 data from the 5 multi-level bedrock monitoring wells between the Higgins Farm site and the workspace at Compressor Station 206 indicates PCE concentrations below 1 μg/L in 10 of 13 samples obtained from depths of 42.5 to 194.5 feet. In the three remaining samples, obtained from depths of 140 to 190 feet, the maximum concentration of PCE detected was 2.9 μg/L, exceeding the NJDEP GWQS. As indicated on figure 4.3.1-1, the PCE plume was about 400 feet from construction workspaces and about 850 feet from the proposed compressor building.



0 250 500 Feet

1:6,000

N W E S

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Figure 4.3.1-1
Northeast Supply Enhancement Project
Extent of Perchloroethylene (PCE) Contamination in the Bedrock Aquifer at Higgins Farm Superfund Site
Somerset County, New Jersey

Existing Transco Pipeline
Compressor Station 206 Workspace
Compressor Station 206 Property Boundary
Compressor Station 206 Building
Proposed Access Road
Higgins Farm Superfund Site
Current & Historic Groundwater Extraction Wells
Current & Historic Groundwater Monitoring Wells
PCE >5µg/L (2013)
PCE >5µg/L (2015)

Date: (8/27/2018) Source: Z:\Clients\O_T\Transco\NESE_Project\ArcGIS\2018\EIS\Additional_Figure_Edits\Higgins_Farm_Groundwater_Plume.mxd

The most recent groundwater sampling was conducted in late 2017 and included two of the four monitoring wells on the Compressor Station 206 site (EPA, 2018). In one well, benzene was detected at a concentration of 1.4 μg/L in a sample obtained from a depth of 103 feet; the NJDEP GWQS for benzene is 1.0 μg/L. In the other well, vinyl chloride was detected at a concentration of 1.1 μg/L in a sample obtained from a depth of 190 feet; the NJDEP GWQS for vinyl chloride is 1.0 μg/L. Shallower groundwater samples were obtained from each of these locations, but no VOCs were detected at concentrations above their respective NJDEP GWQS. In the most recent 5-year review of the Higgins Farm Superfund Site, the EPA concludes that the groundwater remediation system is protective of human health and the environment and that contaminated groundwater does not discharge to local wetlands or waterbodies, but recommends that additional remedial action be undertaken in the source area on the site to speed restoration, and that additional monitoring wells be installed to further delineate the downgradient extent of groundwater contamination (EPA, 2018).

Based on Transco's geotechnical soil borings, ground elevations at the compressor station range from about 267 to 275 feet above mean sea level. In September 2015, the highest water level elevation measured in the four EPA monitoring wells on the compressor station site was 238 feet above mean sea level, or about 30 feet below the proposed facility. Transco anticipates that the maximum excavation depth at Compressor Station 206 would be 15 feet, the maximum depth at which diabase bedrock was encountered. Transco reviewed its construction plans with the EPA, which assisted us in our environmental review of the NESE Project. The EPA concludes that Transco's activity is not expected to impact on-going cleanup activities but notes that it would be beneficial for Transco to install a soil vapor barrier beneath occupied buildings to eliminate the potential for worker exposure to soil vapors (EPA, 2018).

4.3.1.7 Project Groundwater Use

Construction of the NESE Project would require approximately 3.2 million gallons of water for hydrostatic testing, HDD installations, and construction of aboveground facilities (see section 4.3.2.6). As discussed in section 4.3.2.6, approximately 2.6 million gallons (52 percent) of construction-related water would be obtained from surface water sources and the remaining 2.4 million gallons (48 percent) would be obtained from existing municipal sources.

Water requirements at existing or modified aboveground facilities would be minimal as none of the facility operations would require significant water use during normal operations. At Compressor Station 206, Transco intends to connect to the existing municipal water supply system in the area. As indicated in table 1.4-1, Franklin Township is planning to upgrade the municipal water service near Compressor Station 206, which Transco states would provide adequate water supply for operation of the station. Transco has stated that it would install a potable water tank(s) for temporary operational water use if the municipal repairs are not completed before Compressor Station 206 goes into service. As such, we conclude that the planned upgrades can reasonably provide the required municipal water service at Compressor Station 206. Additional discussion of public safety at Compressor Station 206 is provided in section 4.11.4.

4.3.1.8 Impacts and Mitigation

Construction and operation of the NESE Project could impact groundwater resources in different ways. Surface drainage and groundwater recharge patterns can be temporarily altered by clearing, grading, trenching, and soil stockpiling activities, potentially causing fluctuations in groundwater levels and/or increased turbidity, particularly in shallow, surficial aquifers. Based on geotechnical soil boring results and other information, the majority of Project construction would occur above the shallow, surficial aquifers that typically occur in unconsolidated deposits in the Project area. Therefore, most direct impacts on groundwater resources would be avoided. Where the water table is within trench or grading depth, the elevation and flow characteristics of the water table could be temporarily affected by dewatering, and groundwater quality could be temporarily affected by increased turbidity. These impacts would be temporary, minor, and localized to the area near to construction, and would be further reduced by restoring surface contours to pre-construction conditions and implementing other measures in Transco's Plan and Procedures to minimize construction time and erosion. Transco would also comply with state and local discharge permits to mitigate potential impacts on surficial aquifers during hydrostatic testing discharge and trench dewatering activities. After construction is complete, Transco would conduct soil decompaction as necessary, restore the ground surface as closely as practicable to original contours, and revegetate any previously vegetated areas to restore pre-construction overland flow patterns and groundwater recharge.

The use of the HDD method on the Madison Loop and onshore segment of the Raritan Bay Loop could potentially impact groundwater resources. The HDD method is commonly used throughout the U.S. and involves the use of drilling fluid to remove drill cuttings, lubricate the drill bit, and maintain the borehole (see section 2.3.2.1). Drilling fluid is primarily comprised of water containing 2 to 5 percent high yield bentonite by volume. Bentonite is a naturally occurring, non-toxic, and non-hazardous clay mineral that is commonly used in the installation of potable water wells. If needed to manipulate the rheological properties for optimized drilling operations, the drilling fluid may also be augmented with starch, cellulose, non-toxic polymers, and/or crystalline silica. As discussed in section 2.3.2.1, in general, the additives would be NSF/ANSI 60 approved. Upon selecting the HDD contractor, Transco would file with the Secretary of the Commission (Secretary) the safety data sheets for all drilling fluid additives for our review and approval prior to construction. Under normal conditions, drilling fluid is recirculated and reused throughout the HDD process, with a small amount being retained in the immediate area of the borehole. If the drill bit encounters highly coarse materials, large fractures, or other large voids, drilling fluid can be lost in the subsurface environment. The primary impact that lost drilling fluid would have on groundwater quality would be increased turbidity. In general, the magnitude and duration of increased turbidity would depend on the volume of fluid lost, and would diminish with distance and time from the point of loss. Water supply wells located downgradient from the point of loss could also experience increased turbidity and reduced capacity; however, as noted in section 4.3.1.4, no public or private water supply wells were identified within 150 feet of Project workspaces along the Madison Loop and onshore segment of the Raritan Bay Loop where the HDD method would be used. To minimize potential impacts on groundwater resources, Transco would implement its Onshore Horizontal Directional Drill Contingency Plan, which outlines specific procedures and methods for each HDD crossing, including measures to monitor drilling progress and minimize the potential for drilling fluid loss to occur. We reviewed Transco's contingency plan and find that it would reduce the potential for, and magnitude of, a drilling fluid loss should it occur. Based on the above discussion, we conclude that use of the HDD method would not pose a significant risk to groundwater resources.

Shallow groundwater resources could be vulnerable to contamination caused by inadvertent surface spill of hazardous materials used during construction. Accidental spills associated with refueling or storage of fuel, oil, or other fluids, pose the greatest risk to groundwater resources. If not mitigated quickly, contaminated soil could continue to leach and add pollutants to groundwater long after a spill has occurred. Implementation of the measures in Transco's Spill Plan would minimize the potential for groundwater effects associated with an inadvertent spill of hazardous materials during construction. The Spill Plan identifies preventive measures to reduce the likelihood of a spill, such as the use of secondary containment for storage of petroleum products, routine inspection of containers and tanks for leaks, and restricting refueling and liquids transfer to pre-designated locations away from sensitive areas. The Spill Plan also specifies measures to contain and recover a spill should one occur. We have reviewed Transco's Spill Plan and find that it would minimize the potential for, and impact of, hazardous material spills.

We received comments that the storage and handling of hazardous materials at Compressor Station 206 would pose a serious risk to groundwater resources in the area. In accordance with applicable DOT, state, and local requirements, Transco would install and maintain facilities specifically designed and constructed to safely contain hazardous chemicals, including diesel exhaust fluid (urea), oily water, and natural gas condensate. More specifically, these products would be stored in aboveground tanks constructed of heavy duty double-walled plastic or carbon steel situated in external concrete containment secondary containment structures. Urea would be stored in two, 12,000-gallon tanks; oily water would be stored in one 8,400-gallon tank; and natural gas condensate would be stored in one 4,200-gallon tank. Transco would also respond to any hazardous material spills in accordance with its Project-specific Spill Plan discussed above. In addition, Transco's facilities, including hazardous material storage systems, would be subject to inspection by local fire prevention authorities, which would further reduce the potential for an accidental spill. We also note that no public or private water supply wells or springs were identified within 0.25 mile of the proposed compressor station. For these reasons, we conclude that operation of Compressor Station 206 would not represent a significant risk to groundwater resources or water supply wells in the area.

Construction of the Project could physically damage water supply wells located within the construction workspace, or result in increased turbidity and reduced capacity in nearby water supply wells and springs. A hazardous material spill could also impact a water supply well if the spill were to contaminate groundwater within the capture zone of the well. In general, the potential to impact nearby wells is low because most Project construction would occur above the water table and because most wells would be screened well below construction depth. Impacts due to hazardous material spills would also be avoided or minimized by implementing Transco's Spill Plan as discussed above. To further minimize the potential to impact water supply wells, Transco would seek well owner permission to conduct pre- and post-construction testing of water quality and yield using a qualified, independent consultant to conduct the sampling and an approved, state-certified laboratory for analysis. Transco would provide sample results to well owners once analytical results are received. If construction-related activities temporarily affect water quality or yield of domestic or public wells or springs, Transco would provide an alternative water source and/or other compensation to the well owner(s). If construction-related activities permanently affect a well or spring, Transco would repair, replace, or provide an alternative source of potable water. Transco would file a report with the Secretary within 30 days of placing the facilities in service, discussing whether any complaints were received concerning well yield or water quality and how each was resolved. We conclude that these plans would adequately protect water supply wells in proximity to the Project. However, as previous noted, Transco continues to consult with landowners and public officials to more precisely locate water supply wells and springs near the Project. Furthermore, Transco has not identified measures to protect wells that have been identified within construction workspace from physical damage. Standard industry practice is to flag and fence wells within workspaces with a specified protective buffer, and we conclude these measures are likely implementable to avoid physical damages. In addition, field-verified data is preferable to precisely identify mitigation measures for individual well owners and set clear expectations for construction compliance. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a final table identifying all water supply wells and springs, field-verified, within the construction workspaces of the NESE Project, and all other water supply wells and springs within 150 feet of the Project workspaces. The table should provide the location of each well and spring by milepost, and the distance and direction of each well and spring from the construction workspace. Transco should also describe the measures that it would implement to protect any wells or springs within construction workspaces from physical damage, for review and written approval of the Director of OEP.**

Pre-existing contaminated groundwater could be encountered during overland construction of the Madison Loop. As discussed in section 4.7.8.3, Transco would implement the measures in its Materials and Waste Management Plan if contaminated water is encountered along the Madison Loop, including regulatory coordination that Transco would take to properly manage contaminated groundwater. Transco would also implement the measures in its Unanticipated Discovery of Contamination Plan in the event of an unexpected discovery of soil, groundwater, or sediment contamination at any location affected by the Project. By implementing these measures and our recommendation, we conclude that the Project would not exacerbate pre-existing groundwater contamination.

In summary, we conclude that construction and operation of the NESE Project would not result in significant impacts on groundwater resources, including resources within designated sole source aquifer areas and WHPAs, and that impacts would be further avoided or minimized by implementing Transco's construction and restoration plans and our recommendations, and complying with other regulatory permit conditions that are protective of water resources.

4.3.2 Onshore Surface Water Resources

Surface waters include rivers, streams, creeks, lakes, ponds, and ditches that support or may support multiple public uses including drinking water, recreation, fish and wildlife habitat, and industrial and agricultural production. Surface water resources are managed and protected on national, state, and local levels. Offshore surface water resources are discussed in section 4.3.3, and wetlands are discussed in section 4.3.4.

Waterbodies are defined by the FERC as any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as lakes and ponds. We also define waterbodies as major, intermediate, and minor based on the width of the water crossing at the time of construction. Major waterbodies are those that are greater than 100 feet wide, intermediate waterbodies are greater than 10 feet wide but less than or equal to 100 feet wide, and minor waterbodies are those that are less than or equal to 10 feet wide. Waterbodies may be characterized as having perennial, intermittent, or ephemeral flow. Perennial waterbodies contain water for all or most of the year, intermittent waterbodies flow seasonally or following rainfall events, and ephemeral waterbodies flow only during or shortly after precipitation events or spring snowmelt.

4.3.2.1 Existing Watersheds

The USGS defines watersheds by regions, sub-regions, accounting units, and cataloging units. Each watershed is identified by a unique hydrologic unit code (HUC) consisting of 2 to 14 digits (USGS, 2017a). The NESE Project would cross several major basins including the Lower Susquehanna and Lower Delaware basins in Pennsylvania, and the Lower Hudson basin in New Jersey, as outlined in table 4.3.2-1. The sub-basins, watersheds, and HUCs are also outlined in table 4.3.2-1.

4.3.2.2 Existing Onshore Surface Water Resources

Table 4.3.2-2 summarizes the waterbody types crossed by the Project based on environmental field surveys, and table 4.3.2-3 provides details for all waterbodies within Project workspaces. Intermittent and perennial waterbodies are the most common types of surface waters that would be impacted by construction of the Quarryville Loop, Madison Loop, and Compressor Station 206 (see table 4.3.2-2). The Project would not impact any waterbodies at Compressor Station 200 or along the onshore portion of the Raritan Bay Loop.

TABLE 4.3.2-1

Watersheds Crossed by the Onshore Portion of the Northeast Supply Enhancement Project

Facility	Begin Milepost	End Milepost	Sub-Region (HUC 4)	Major Basin (HUC 6)	Sub-basin (HUC 8)	Watershed (HUC 10)
PENNSYLVANIA						
Quarryville Loop	1681.0	1687.9	Susquehanna (0205)	Lower Susquehanna (020503)	Lower Susquehanna (02050306)	Susquehanna River (0205030617)
	1687.9	1690.1				Octoraro Creek (0205030615)
	1690.1	1690.3				Pequea Creek (0205030612)
	1690.3	1692.3				Octoraro Creek (0205030615)
Compressor Station 200	N/A	N/A	Delaware (0204)	Lower Delaware (020402)	Schuylkill (02040203)	Lower Shuylkill River (0204030310)
					Brandywine-Christina (02400205)	East Branch Brandywine Creek (0204020501)
NEW JERSEY						
Madison Loop	8.6	9.7	Lower Hudson - Long Island (0203)	Lower Hudson (020301)	Raritan (02030105)	South River (0203010504)
	9.7	12.0	Lower Hudson - Long Island (0203)	Lower Hudson (020301)	Sandy Hook - Staten Island (02030104)	Raritan Bay - Lower Bay (0203010404)
Raritan Bay Loop (Onshore)	12.0	12.2	Lower Hudson - Long Island (0203)	Lower Hudson (020301)	Sandy Hook - Staten Island (02030104)	Raritan Bay - Lower Bay (0203010404)
Compressor Station 206	N/A	N/A	Lower Hudson - Long Island (0203)	Lower Hudson (020301)	Raritan (02030105)	Millstone River (0203010503)

TABLE 4.3.2-2

Summary of Waterbodies Within the Northeast Supply Enhancement Project Workspaces

						FERC Classification			
Facility	Perennial Waterbodies	Intermittent Waterbodies	Ephemeral Waterbodies	Open Water	Total	Major	Intermediate	Minor	Not Classified [a]
PENNSYLVANIA									
Quarryville Loop	8	2	1	1	12	0	5	5	2
NEW JERSEY									
Madison Loop	2	8	2	0	12	1	5	3	3
Compressor Station 206 (Access Road)	0	1	1	0	2	0	0	0	2
Project Total	10	11	4	1	26	1	10	8	7

[a] Waterbodies not crossed by the pipeline centerline.

TABLE 4.3.2-3

Waterbodies Crossed by the Northeast Supply Enhancement Project Facilities

State/Facility/ Location/Project Component	Milepost	Waterbody ID	Waterbody Name	Crossing Width [a]	Stream Type	FERC Classification [a]	State Classification	Crossing Window [b]	Crossing Method [a]
PENNSYLVANIA									
Quarryville Loop									
Lancaster County									
Drumore Township									
Pipeline	1681.9	WW-T02-008	Wissler Run	25	Perennial	Intermediate	HQ-WWF, MF	Jan 1 - Sept 30	Dry-ditch
Workspace	1681.9	WW-T02-008A	UNT to Wissler Run	N/A	Ephemeral	N/A	HQ-WWF, MF	Jan 1 - Sept 30	N/A
Pipeline	1683.5	WW-T02-013	Fishing Creek	9.8	Perennial	Minor	HQ-CWF, MF	Jan 1 - Feb 28; June 16 - Sept 30	Dry-ditch
Workspace	1683.5	WB-T02-012	N/A	N/A	N/A	N/A	HQ-CWF, MF	None identified.	N/A
Pipeline	1685.0	WW-T02-010	UNT to Fishing Creek	4	Perennial	Minor	HQ-CWF, MF	Jan 1 - Sept 30	Dry-ditch
East Drumore Township									
Pipeline	1685.7	WW-T02-001	UNT to Conowingo Creek	2	Intermittent	Minor	HQ-CWF, MF	April 2 - Sept 30	Dry-ditch
Pipeline	1686.5	WW-T02-005	Conowingo Creek	40	Perennial	Intermediate	HQ-CWF, MF	April 2 - Sept 30	Dry-ditch
Pipeline	1686.7	WW-T02-006	UNT to Conowingo Creek	34	Perennial	Intermediate	HQ-CWF, MF	April 2 - Sept 30	Dry-ditch
Pipeline	1687.4	WW-T02-007	UNT to Conowingo Creek	18	Perennial	Intermediate	HQ-CWF, MF	April 2 - Sept 30	Dry-ditch
Pipeline	1688.5	WW-T02-011	UNT to Stewart Run	2	Perennial	Minor	HQ-CWF, MF	Year Round	Dry-ditch
Pipeline	1689.4	WW-T06-001	UNT to Stewart Run	15	Perennial	Intermediate	HQ-CWF, MF	Year Round	Bore
Eden Township									
Pipeline	1690.5	WW-T02-012	UNT to Bowery Run	6	Intermittent	Minor	HQ-CWF, MF	Year Round	Dry-ditch
NEW JERSEY									
Madison Loop									
Middlesex County									
Old Bridge Township									
Pipeline	8.6	WW-T01-001	UNT to Tennent Brook	13 [c]	Intermittent	Intermediate	FW2-NT	Aug 1 - April 30	Dry-ditch
Workspace	8.6	WW-T01-001A	UNT to Tennent Brook	N/A	Ephemeral	N/A	FW2-NT	Aug 1 - April 30	N/A
Pipeline	8.8	WW-T01-002 [d]	UNT to Tennent Brook	11	Intermittent	Intermediate	FW2-NT	Aug 1 - April 30	Dry-ditch
Pipeline	9.0	WW-T15-003	UNT to Tennent Brook	7	Intermittent	Minor	FW2-NT	Aug 1 - April 30	HDD [e]
Pipeline	9.1	WW-T15-002	UNT to Tennent Brook	2	Intermittent	Minor	FW2-NT	Aug 1 - April 30	HDD [e]
Pipeline	9.1	WW-T15-002A	UNT to Tennent Brook	N/A	Intermittent	Minor	FW2-NT	Aug 1 - April 30	HDD [e]
Pipeline	9.2	WW-T15-004A	UNT to Tennent Brook	33	Intermittent	Intermediate	FW2-NT	Aug 1 - April 30	HDD [e]

TABLE 4.3.2-3 (cont'd)

Waterbodies Crossed by the Northeast Supply Enhancement Project Facilities

State/Facility/ Location/Project Component	Milepost	Waterbody ID	Waterbody Name	Crossing Width [a]	Stream Type	FERC Classification [a]	State Classification	Crossing Window [b]	Crossing Method [a]
Workspace	9.3	WW-T15-004B	UNT to Tennent Brook	N/A	Intermittent	N/A	FW2-NT	Aug 1 - April 30	N/A
Workspace	9.3	WW-T15-005	UNT to Tennent Brook	N/A	Ephemeral	N/A	FW2-NT	Aug 1 - April 30	N/A
Pipeline	10.1	WW-T01-004	UNT to Cheesequake Creek	11	Intermittent	Intermediate	FW2-NT/SE-1	Aug 1 - March 31 [f]	Dry-ditch
Sayreville Township									
Pipeline	11.6	WW-RS-005	Crossway Creek	49	Perennial	Intermediate	FW2-NT/SE-1	Aug 1 - March 31 [f]	HDD [e]
Pipeline	11.7	WB-T01-001	UNT to Cheesequake Creek (Marina)	257	Perennial	Major	FW2-NT/SE-1	Aug 1 - March 31 [f]	HDD [e]; Hydrostatic Test Water Withdrawal
Compressor Station 206									
Somerset County									
Franklin Township									
Access Road	N/A	WW-T13-001	UNT to Delaware and Raritan Canal	N/A	Intermittent	N/A	FW2-NT	Aug 1 - April 30	Culvert
Access Road	N/A	WW-T13-002	UNT to Delaware and Raritan Canal	N/A	Ephemeral	N/A	FW2-NT	Aug 1 - April 30	Culvert

[a] Crossing length based on ordinary high water mark field delineation. "N/A" indicates waterbodies that are not crossed by the pipeline centerline.

[b] Fishery classifications and crossing windows for waterbodies in Pennsylvania were reviewed by the PAFBC. Except where noted, crossing windows for waterbodies within New Jersey were reviewed by the NJDEP.

[c] Crossing length based on top-of-bank measurement.

[d] Stream includes three crossings; one pipeline crossing, one access road crossing, and one additional temporary workspace crossing; crossing length represents pipeline crossing only.

[e] Foot traffic only, associated with placement of the HDD tracking wires.

[f] Timing restriction pending confirmation with the NJDEP, Division of Fish and Wildlife (see section 4.5.1.3).

Key:
UNT = Unnamed Tributary
CWF = Coldwater Fishes
WWF = Warmwater Fishes
HQ = High Quality
MF = Migratory Fishes
TSF = Trout Stocked Fishery
FW2-NT = Freshwater, Non-Trout Fishery
SE-1 = Saline Estuarine
N/A = not applicable.

4.3.2.3 Flood Zones

FEMA produces flood insurance rate maps for municipalities across the nation to identify flood hazard areas and assess flood risks, and cooperates with state and local agencies to provide accurate flood risk data (FEMA, 2017a). FEMA classifies flood hazard zones as either Zone A, Zone AE, or Zone VE. Zone A, AE, and VE areas have a 1 percent annual chance of flood event, which are known as the 100-year-flood zone. Additionally, Zone VE areas are subject to inundation by the 1-percent-annual-chance flood events with added hazards due to increased wave action during storms (FEMA, 2017b). Floodway areas include the stream channel plus any adjacent areas that must be kept free of encroachment to allow the base flood waters to be carried downstream without substantial increase in water levels (FEMA, 2017a).

We reviewed the FEMA Flood Insurance Rate Maps to identify flood hazard area locations within the 100-year floodplain crossed by the Project (see table 4.3.2-4). The only onshore Project facilities that would occur within a flood zone would be pipeline looping. None of the ancillary facilities (e.g., existing and new MLVs, CP systems) would be in a designated floodplain, and none of existing Compressor Station 200, including the area of the facility that would be modified for the Project, is within a designated floodplain. The northeastern perimeter of the 52.1-acre parcel on which Compressor Station 206 would be constructed is within the 100-year floodplain of Carter's Brook, which begins about 1,000 feet upstream from the compressor station site. Transco designed the facilities in a manner to avoid impacts on these floodplains. Flood hazard mapping available on the Franklin Township website identifies limited 500-year flood zones along Carter's Brook in lower reaches of the brook about 1 mile downstream from the compressor station site, but does not depict any 500-year flood hazard areas at the compressor station site. Therefore, the Compressor Station 206 aboveground facilities and access road would not be within a floodplain.

TABLE 4.3.2-4

Summary of FEMA 100-Year Floodplains Crossed by the Onshore Portion of the Northeast Supply Enhancement Project

State/Facility	Flood Hazard Areas (acres)	Floodways (acres)	FEMA Classification
PENNSYLVANIA			
Quarryville Loop	1.7	0	Zone A
NEW JERSEY			
Madison Loop	5.2	0.1	Zone A, Zone AE

4.3.2.4 Onshore Surface Water Beneficial Uses and State Classifications

Each state or commonwealth crossed by the Project has developed its own regulatory system for evaluating, classifying, and monitoring the quality and uses of surface waters. Each system includes the "beneficial use designations" that describe the potential or realized capacity of a waterbody to provide defined ecological and human population benefits. A summary of the beneficial use designations for each state is provided below. The state classifications for each waterbody are provided in table 4.3.2-3.

Pennsylvania Surface Water Classifications

Pennsylvania Code Title 25, Chapter 93 establishes water quality standards for each waterbody according to its use. Pennsylvania surface water uses are classified as:

- Coldwater fishes (CWF) – maintenance or propagation, or both, of fish species and additional flora and fauna indigenous to a coldwater habitat;

- Warmwater fishes (WWF) – maintenance and propagation of fish species and additional flora and fauna indigenous to a warm water habitat;

- Migratory fishes (MF) – passage, maintenance, and propagation of anadromous and catadromous fishes and other fishes that move to or from flowing waters to complete their life cycle in other waters; and

- Trout stocked (TSF) – maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna indigenous to a warm water habitat.

Selected waterbodies are further classified as exceptional value or high quality and are given special protection. For a surface water to be classified as high quality, the waterbody must meet water quality or biological parameters outlined in Pennsylvania Code Title 25 Chapter 93b. To qualify as an exceptional value waterbody, the surface water must meet the criteria for a high quality waterbody and fulfill at least one of the following:

- located in a National Wildlife Refuge or a state game propagation and protection area;

- located in a designated state park natural area or state forest natural area, national natural landmark, federal or state wild river, federal wilderness area, or national recreation area;

- a surface water of exceptional recreational significance;

- a surface water of exceptional ecological significance;

- a surface water that scores at least 92 percent in the appropriate biological assessments; or

- designated as a wilderness trout stream.

Transco provided the PAFBC with the waterbodies that would be crossed by the Project and its proposed crossing methods and timing restrictions. As listed in table 4.3.2-3, the Quarryville Loop would cross nine waterbodies classified as high quality for coldwater fisheries and one waterbody classified as high quality for warmwater fisheries. In addition, two waterbodies would be within the construction work area of the Quarryville Loop, but not crossed by the proposed pipeline, including one waterbody classified as high quality for coldwater fisheries and one waterbody classified as high quality for warmwater fisheries.

New Jersey Surface Water Classifications

NJAC 7:9B classifies surface waters by their physical, chemical, and biological characteristics; location (i.e., Pinelands); and recreational use. Surface water classifications are grouped under two NJDEP antidegradation designations; Category One and Category Two waters. Category One designations provide protection to waterbodies that helps prevent water quality degradation that would impair natural resources, and typically include surface waters located within state and federal parks, wildlife management areas, trout production waters, and shellfish production waters. Category Two waters include all other non-outstanding resource waters.

- Category One Waters
  - FW1 – these resources are classified as outstanding waters based on multiple criteria such as scenic setting, ecological significance, water supply significance, significant fisheries resource, and water quality parameters.
- Category Two Waters
  - FW2 – these waters are non-outstanding resources, and are further classified by trout habitat suitability:
    - FW2-TP – waters that support trout spawning and nursing;
    - FW2-TM – waters that support general trout habitat throughout the year; and
    - FW2-NT – waters that do not support trout populations.
  - SE-1 – estuarine waters that support shellfish, regulated by NJAC 7:12.
  - SC – coastal saline waters that support shellfish, regulated by NJAC 7:12.

Transco provided the NJDEP with the waterbodies that would be crossed by the Project and its proposed crossing methods and timing restrictions. As listed in table 4.3.2-3, the Madison Loop would cross five waterbodies classified as non-trout freshwater streams (FW2-NT) and three waterbodies classified as non-trout fresh water/saline estuarine waters (FW2-NT/SE-1). In addition, four waterbodies would be within the construction work area of the Madison Loop, but not crossed by the proposed pipeline, all of which are classified as non-trout freshwater streams (FW2-NT). The two waterbodies crossed by the proposed access road for Compressor Station 206 are classified as non-trout fresh water (FW2-NT).

4.3.2.5 Sensitive Waterbodies

Waterbodies may be considered sensitive to pipeline construction for several reasons, including, but not limited to:

- waters that do not meet the water quality standards associated with the water's designated beneficial uses or has a presence of contaminated sediments, or have been designated for intensified water quality management and improvement (e.g., impaired waterbodies);
- rivers on or designated to be added to the Nationwide Rivers Inventory (NRI) or a state river inventory;
- waters that have outstanding or exceptional quality, ecological and recreational importance, or are in sensitive and protected watershed areas;
- waterbodies that are crossed less than 3 miles upstream of potable water intake structures (see table 4.3.2-4); and/or
- waterbodies that contain sensitive fisheries, threatened or endangered species, or critical habitat (see section 4.5.1.3).

Impaired Surface Waters and Contaminated Sediments

As described in section 4.3.2.4, each state/commonwealth has developed a set of designated beneficial uses and water quality classifications for waters within the state/commonwealth. Section 303(d) of the CWA requires each state/commonwealth to identify waters within their state where current pollution control technologies alone cannot meet the water quality standards set for that waterbody. Every 2 years, states are required to submit a list of these impaired waters as well as any that may soon become impaired to EPA. The impaired waters are prioritized based on the severity of the pollution and the designated beneficial use of the waterbody. States must establish the total maximum daily load(s) (TMDL) of the pollutant(s) in the waterbody for impaired waters on their list.

The 303(d) lists for Pennsylvania (EPA, 2017c; PADEP, 2017c) and New Jersey (EPA, 2017d) were reviewed to identify impaired onshore waterbodies crossed by the Project (see table 4.3.2-5). No impaired waters were identified for Compressor Station 200, Compressor Station 206, the Madison Loop, or the Raritan Bay Loop (onshore), and as such, there are no state-approved TMDLs within those workspaces.

TABLE 4.3.2-5

Impaired Waterbodies Crossed by the Northeast Supply Enhancement Project

Facility/State/Project/Waterbody	Milepost	Impaired Designated Use(s)	Pollutant(s) – 303(d) List
PENNSYLVANIA			
Quarryville Loop			
Fishing Creek	1683.5	Aquatic Life	Siltation
Unnamed Tributary (UNT) to Fishing Creek	1685.0	Aquatic Life	Siltation
Conowingo Creek	1686.5	Aquatic Life	Nutrient Loading, Suspended Solids
UNT to Bowery Run	1690.5	Aquatic Life	Siltation

The Quarryville Loop crosses four waterbodies that are listed as impaired on the Pennsylvania section 303(d) list for impaired aquatic life. Conowingo Creek has a state-approved TMDL for sediment and phosphorus that was completed in 2001 by the PADEP. The other three waterbodies (Fishing Creek, unnamed tributary to Fishing Creek, and unnamed tributary to Bowery Run) do not have a scheduled TMDL.

Wild and Scenic Rivers

The NPS manages the NRI, which is a list of over 3,400 river segments throughout the United States that are classified as national wild, scenic, or recreational river areas, and are considered outstandingly remarkable cultural or natural resource value (NPS, 2011). In Pennsylvania, the PADCNR implements the Scenic Rivers Act (P.L. 1277, Act No. 283 as amended by Act 110), which establishes criteria for designating river segments for inclusion on the Pennsylvania Scenic Rivers System. No federally designated wild and scenic rivers are in the vicinity of or crossed by the Project. No waterbodies crossed by the Quarryville Loop or Compressor Station 200 are listed on the Pennsylvania Scenic Rivers System (PADCNR, 2017a).

New Jersey recognizes the federally listed river segments as part of the NRI, but has no state mandated wild and scenic river program. No wild or scenic rivers are crossed by the Project in New Jersey (National Wild and Scenic Rivers System, 2017).

Potable Water Intakes and Source Water Protection Areas

Under the SDWA, states use a watershed approach to assess and delineate source water protection areas (SWPAs) around surface waterbodies that are used as public drinking water sources. Transco consulted with the PADEP and NJDEP to determine whether any waterbody crossings would be within 3 miles upstream of public potable water intakes or if the Project would cross any SWPAs. SWPAs are divided into three zones based on hydrologic proximity, and thus, sensitivity, to a surface water intake point:

- A Zone A SWPA is a 0.25-mile-wide corridor along a waterbody that extends 0.25 mile downstream from an intake point to all reaches of the waterbody within a 5-minute flow time upstream of the intake point.
- In watersheds encompassing less than 100 square miles, Zone B SWPAs are all remaining watershed areas upstream of the intake point. In watersheds encompassing more than 100 square miles, Zone B SWPAs are the area outside of Zone A SWPAs within a 2-mile-wide corridor extending upstream to the 25-hour flow time from the intake point.
- Zone C SWPAs are any remaining watershed areas upstream of the intake point and outside of Zone A and Zone B areas.

Transco did not identify any surface water intakes within 3 miles downstream from Project waterbody crossings in Pennsylvania. The Quarryville Loop would be within 150 feet of Zone A of public water system 1230004 operated by the Chester Water Authority, and Compressor Station 200 is within 0.25 mile of Zone A of public water system 1150106 operated by the Pennsylvania American Water Company. Based on consultation with the water system operators, Transco determined that the public water intakes associated with these SWPAs are located 7.8 river miles and 17.2 river miles downstream from the Project facilities, respectively.

In New Jersey, Transco did not identify exact locations for public surface water intakes but determined that the Madison Loop would cross at least one waterbody within Zone A of public water system 1216001 operated by the Middlesex Water Company - Utility Service Affiliate (Perth Amboy), Inc. The NJDEP Source Water Assessment for this public water system indicates that source water is obtained from six water supply wells, five of which are listed as “under the influence of surface waters,” and that water can be purchased on an emergency basis from a surface water source also operated by the Middlesex Water Company. Transco also determined that Compressor Station 206 would be within Zone A of public water system 2004002 operated by the New Jersey American Water Company - Elizabethtown Division. The NJDEP Source Water Assessment for this public water system indicates that source water is obtained from numerous wells and seven surface water intakes, including five on the Raritan River, one on the Millstone River, and one on the Delaware and Raritan Canal. As indicated in table 4.3.2-3, the access road to Compressor Station 206 would cross two unnamed tributaries (one intermittent waterbody and one ephemeral waterbody) to the Delaware and Raritan Canal, which is about 1.1 miles to the west of the site.

Waterbodies within Regulated Riparian Zones

In Pennsylvania, non-wetland riparian areas are regulated pursuant to Pennsylvania Code Title 25 Chapter 102.14, which requires a 150-foot riparian buffer around perennial or intermittent waterbodies within an exceptional value or high-quality watershed, as long as the watershed is attaining its designated use. Within an impaired exceptional value or high-quality watershed, the protection or creation of a forested riparian buffer within 150 feet around a waterbody is required.

In New Jersey, non-wetland riparian areas are regulated under NJAC 7:13-10.2 (i.e., the Flood Hazard Area Control Act). Activities within flood hazard areas and riparian zones are regulated, where regulated flood hazard areas vary based on the 100-year floodplain. Waters with a drainage area of at least 50 acres or greater have both a regulated flood hazard area and a regulated riparian zone, while waters with a drainage area less than 50 acres only have a regulated riparian zone. Regulated riparian zones are based on the following criteria:

- 300 feet on both sides of the waterbody for Category One waters, and all associated tributaries upstream of it in the same watershed (HUC-14);
- 150 feet on both sides of the waterbody for any:
    - trout production and maintenance waters and their tributaries 1 mile upstream; and
    - any water flowing through documented habitat for threatened or endangered species and their tributaries 1 mile upstream; and
- 50 feet on both sides of the waterbody for all other regulated waters.

Transco consulted with PADEP and NJDEP to identify riparian areas within the workspace of the Project. Transco would adhere to the maximum allowable vegetation disturbance areas set forth by the applicable agencies, and the proposed mitigation, which may include compensatory mitigation. Transco completed its consultation with the PADEP but consultation with the NJDEP is ongoing and riparian zone mitigation is currently pending. Any proposed mitigation would be reviewed during the NJDEP's permit review process.

4.3.2.6 Water Use

Constructing the Project would require the use of water for hydrostatic testing, dust control, and the HDD construction method. Each state administers a program to regulate the withdrawal and discharge of water used under the federal NPDES permit program and Transco has indicated that it would obtain the necessary permits to obtain and discharge water used during Project construction (see table 1.5-1).

Hydrostatic Testing Withdrawal

Hydrostatic testing is described in detail in section 2.3.1.9 and is required to comply to DOT safety regulations in 49 CFR 192. Transco estimates that about 3.2 million gallons of water would be needed for hydrostatic testing of the proposed onshore pipeline and aboveground facilities. Surface water and municipal sources would be used for hydrostatic testing, as outlined in table 4.3.2-6. Hydrostatic testing withdrawals for offshore facilities are presented in section 2.3.3.8.

TABLE 4.3.2-6

Anticipated Hydrostatic Test Water Source Locations for the Onshore Project Facilities

Facility/State/Project	Test Segment MP Begin	Test Segment MP End	Water Source and Use Restrictions	Water Withdrawal Location (MP)	Discharge Location (MP) [a]	Discharge Rate (gpm) [b]	Approximate Volume (gallons)
PENNSYLVANIA							
Quarryville Loop	1681.0	1691.2	Municipal	N/A	1681.0 and 1691.2	2,000	2.14 million
Compressor Station 200	N/A	N/A	Municipal	N/A	N/A	2,000	42,778
NEW JERSEY							
Madison Loop	8.6	12.0	UNT to Cheesequake Creek (Marina)	11.8	11.8	2,000	462,000
Compressor Station 206	N/A	N/A	Municipal	N/A	N/A	2,000	600,000

[a] All hydrostatic test waters would be discharged to a well vegetated upland site within Project workspaces except for the hydrostatic test waters needed for the Madison Loop, which would be discharged through a dewatering structure back to the withdrawal location in accordance with applicable permit conditions.

[b] The rate of discharge would be in accordance with final permit conditions.

Water withdrawals could also result in temporary loss of habitat, change in water temperature and dissolved oxygen levels, and entrainment or impingement of fish or other aquatic organisms. Transco would minimize the potential effects of water withdrawals from surface water by adhering to its Plan and Procedures. During water withdrawals, Transco would maintain base flows, screen intake hoses, and discharge test waters to well-vegetated, upland areas or to receiving waters using energy dissipation devices to minimize the potential for stream scour. Transco would also acquire and adhere to the requirements of the necessary water use and discharge permits and approvals from state and federal agencies. Transco does not plan to add any chemicals or biocides to the hydrostatic test water for the onshore facilities. As such, direct and indirect impacts on waterbodies would be temporary, short-term, and minor.

Dust Control

Transco would use municipal sources for dust control activities as described in Transco's Fugitive Dust Control Plan, which would include using water trucks for dust abatement, and state-approved dust suppressants. Water trucks and dust suppressants would only be used for onshore loops and aboveground facilities, and would be completed in accordance with all applicable regulations.

Horizontal Directional Drill

Transco would utilize fresh water in the drilling of the seven HDDs associated with the NESE Project (see table 2.3.2-1 for the HDD locations). Transco estimates that the three onshore HDDs associated with the Madison Loop, which total 6,030 feet long, would require 1.8 million gallons of water during HDD drilling operations for the creation of drilling fluid. Based on the 9,670-foot total length of the Long and Short CP Power Cable HDDs, the Morgan Shore Approach HDD, and the Ambrose Channel HDD, we estimate that Transco could require approximately 2.9 million gallons more fresh water to complete those HDD operations. HDD procedures for the offshore facilities are further discussed in section 2.3.3.5.

Transco would obtain the fresh water needed to complete the HDDs from municipal sources which, as discussed above, obtain their water from a combination of groundwater and surface water sources. In addition, Transco would obtain the necessary permits and approvals to utilize municipal water for HDD operations, thereby ensuring that an adequate supply of fresh water is available to other users in the Project area.

Following construction, Transco would haul HDD drilling fluids from the four onshore HDDs off-site to an approved disposal site in accordance with applicable state and federal regulations. As described in section 2.3.3.5, Transco proposes to dispose of drilling fluids associated with the offshore HDDs within containment pits excavated in the seafloor.

4.3.2.7 General Impacts and Mitigation

Surface waterbodies could be impacted during construction of the NESE Project. Clearing and grading of stream banks, blasting (if required), in-stream trenching, trench dewatering, pipe laying, and backfilling could each result in increased sedimentation and turbidity, altered water color, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments, thermal effects, modification of riparian areas, and introduction of chemical contaminants (e.g., fuel and lubricants). In almost all cases, these impacts would be limited to the period of in-stream construction, and conditions would return to normal shortly after stream restoration activities are completed. Construction and operation of the Project could also have indirect or secondary impacts on fisheries and other aquatic organisms that utilize the water resources. However, proper construction techniques and timing would ensure that any such effects are temporary and minor (see section 4.5.1.3).

As summarized in table 4.3.2-3 and described in section 2.3.2.1, Transco would implement dry-ditch crossing methods (flume, dam and pump, temporary diversion channel method) to cross waterbodies where the proposed pipeline loops are installed in a trench, and would cross remaining waterbodies using the HDD method. Transco would install circular culverts where the permanent access road to Compressor Station 206 would cross one intermittent and one ephemeral waterbody. During access road construction, grading would be completed to install the culverts with adequate cover to span the drainage features, and drainage swales would be created to convey runoff to the culverts. The culverts would be of sufficient size and design to allow for continued flow within the drainage features during operation of the compressor station.

In general, dry-ditch crossing techniques minimize most construction-related impacts on waterbodies because the construction activity is isolated from flowing water, and the use of the HDD method avoids direct impacts on waterbodies by installing the pipeline well below the waterbody without surface disturbance. Transco would further minimize impacts on waterbodies by implementing construction and restoration procedures described in the Project-specific Procedures, which includes:

- crossing waterbodies as quickly and safely as possible;
- limiting the use of in-stream equipment to that needed for excavation, pipeline placement, and backfilling, except for initial clearing equipment;
- adhering to applicable agency time-of-year restrictions;
- reducing the right-of-way width to 75 feet or less (unless approved by the FERC);
- maintaining a minimum 50-foot setback between ATWS and waterbody boundaries, except in limited locations where site-specific conditions require closer placement of ATWS (see table 2.3-2);
- maintaining adequate flow rates throughout construction to protect aquatic life and prevent the interruption of existing downstream uses;

- locating equipment refueling areas, concrete coating activities, and hazardous material storage to areas at least 100 feet from surface waters;

- installing temporary erosion and sediment control measures across the entire width of the construction right-of-way after clearing and before ground disturbance;

- maintaining temporary erosion and sediment control measures throughout construction until streambanks and adjacent upland areas are stabilized;

- requiring bank stabilization and reestablishing bed and bank contours and riparian vegetation after construction; and

- implementing Transco's Spill Plan if a spill or leak occurs during construction.

Additional details regarding potential impacts and mitigation measures are provided in the following sections.

Erosion and Sediment Control

Transco would implement the following specific measures after clearing and prior to the start of grading activities to prevent and minimize erosion and sedimentation at stream crossings:

- install sediment barriers across the entire workspace along waterbody crossings, as to prevent the flow of sediments into the waterbody;

- install removable sediment barriers (i.e., drivable berms) across the travel lane. They could be removed during the construction activities (i.e., during the day) but must be re-installed after construction has ended for the day, and/or when heavy precipitation is expected;

- install sediment barriers along the edge of the construction right-of-way, where waterbodies are adjacent to the workspace, and where the right-of-way slopes toward the waterbody, as to contain spoils within the workspace, and prevent sediment flow into the waterbody. Sediment barriers would be properly maintained throughout construction and reinstalled as necessary, or until permanent erosion controls are installed or restoration of adjacent upland areas is complete; and

- use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

Transco has also designed waterbody crossings to minimize potential impacts from flash flooding, scouring, and high flow velocities during pipeline construction and operation, and would implement the measures in its Plan and Procedures to reduce the likelihood of sedimentation and erosion during flash flood events. Based on those measures, we conclude that direct impacts on waterbodies due to erosion and sedimentation would be temporary and minor.

Horizontal Directional Drill

The HDD method would avoid direct impacts on waterbodies, but indirect impacts could occur if drilling fluid is inadvertently released into the waterbody during drilling operations. Section 2.3.2.1 includes a detailed description of the HDD process and HDD drilling fluid, which would generally consist of water containing 2 to 5 percent bentonite, a naturally occurring clay mineral. Transco would utilize only fresh water obtained from municipal sources during HDD drilling operations.

The primary impact that an inadvertent release of drilling fluid would have on a waterbody would be increased turbidity within the water column and increased sedimentation in the stream bed. The degree and extent of these impacts would depend on the volume and duration of the drilling fluid release and the physical and hydrologic characteristics of the affected waterbody. As detailed in section 2.3.2.1, Transco would implement its Onshore Horizontal Directional Drill Contingency Plan, which includes measures to monitor the drilling operation and drill path to identify and minimize the potential for lost drilling fluid, minimize the duration of any releases that occur, and contain and clean up drilling fluid on the land surface. We have reviewed Transco's onshore HDD designs, feasibility studies, and Onshore Horizontal Directional Drill Contingency Plan, and conclude that implementation of these construction and mitigation plans would reduce the potential for lost drilling fluids to occur and minimize impacts on resources in the event of lost returns.

Trench Dewatering

During construction, the open trench may accumulate water, either from seepage of groundwater into the trench, or from precipitation. Where trench dewatering is needed, Transco would discharge the water to an energy-dissipating dewatering device (filter bag) located downgradient of the trench, minimizing the possibility of erosion or silt-laden water flowing to any downstream resources. Trench plugs would be used as necessary to separate uplands from waterbodies, preventing inadvertent water diversion or draining into the trench. Dewatering structures would be removed immediately following dewatering. By implementing these and other measures detailed in Transco's Plan and Procedures, we conclude that impacts on waterbodies from trench dewatering activities would be minor and temporary.

Spill Control

Accidental spills and leaks of hazardous materials associated with equipment trailers; the refueling or maintenance of vehicles; and the storage of fuel, oil, and other fluids can have immediate effects on aquatic resources and could contaminate waterbodies downstream of the release point. Transco would implement its Spill Plan to avoid or minimize effects associated with spills or leaks of hazardous liquids. These plans include storing hazardous materials away from wetlands and waterbodies, restrictions on refueling within 100 feet of wetlands and waterbodies, and the use of secondary containment structures for petroleum products. Transco's Spill Plan also specifies routine inspections for storage tanks; soil spill response kits on every vehicle that transports fuel; and measures to contain, clean up, and properly dispose of spills. Transco's implementation of these plans and measures would adequately address the storage and transfer of hazardous materials and petroleum products, and the appropriate response in the event of a spill. Because of these precautions, impacts on waterbodies would be temporary and minor.

Public Surface Water Sources

As discussed above, the Project would cross SWPAs associated with public surface water intakes, and could impact waterbodies within 3 miles upstream from public surface water intakes. The primary impact that could occur on public surface water intakes would be increased turbidity, which we expect would be minor and temporary. In addition, public water systems that utilize surface water are typically managed to mitigate turbidity such as may be associated with spring runoff and storm events. Water quality at public surface water intakes could also be affected by hazardous materials spills. Transco would avoid and minimize the impact of a hazardous material spill by implementing the measures detailed in its Spill Plan, which we reviewed and found to be protective of surface and groundwater resources.

At our request, Transco developed and submitted Notification Plans to the operators of public water systems in the Project area that utilize surface water for at least a portion of their water supply, including the Chester Water Authority, Pennsylvania American Water Company, Middlesex Water Company, and New Jersey American Water Company. The Notification Plans describe the construction and restoration measures that Transco would implement to protect surface water resources, and provide for notification to the water supply operators in the event of an incident that could impact water quality at intake points. Transco requested that the operators comment on the Notification Plans. In its comments on the draft EIS, the Chester Water Authority provided comments regarding notification requirements in the event of a spill within watersheds in Lancaster and Chester Counties during construction and operation of the Project. Specifically, the Chester Water Authority stated that it must be immediately notified of any spills within those watersheds in Lancaster and Chester Counties both during construction of the pipeline as well as during ongoing operations after the construction is complete. No additional comments have been received to date.

By implementing the measures detailed in Transco's construction and restoration plans, Spill Plan, and Notification Plans, we conclude that that the NESE Project would not significantly impact any public surface water source systems.

Cleanup and Restoration

Following placement of the pipeline across the waterbody, the stockpiled spoil material would be placed back in the trench, and the stream banks and streambed would be stabilized and restored as close to their pre-construction contours as feasible in compliance with the Transco's Plans and Procedures, as well as with any permit and agency requirements. Riparian cover on affected stream banks would be expected to recover over several months to several years. Adherence to Transco's Procedures would maximize the potential for regrowth of riparian vegetation, thereby minimizing the potential for any long-term impacts associated with lack of shade and cover.

Operation

Operation of the Project would not result in significant impacts on waterbodies because streambeds, stream banks, and stream flow would be restored to pre-construction conditions. Transco would allow reestablishment of a riparian buffer that is at least 25 feet from the edge of all waterbodies, but could maintain a 10-foot-wide strip centered over the pipeline in an herbaceous state to facilitate periodic corrosion or leak surveys. Trees within 15 feet of the pipeline in the riparian area could also be removed if their roots could compromise the integrity of the pipeline coating.

4.3.2.8 Conclusions

No long-term effects on surface waters are anticipated as a result of construction and operation of the Project. No designated water uses would be permanently affected because the pipeline would be buried beneath the bed of the waterbodies, erosion controls would be implemented during construction, and streambanks and streambed contours would be restored as close as possible to preconstruction conditions. Further, as discussed previously, Transco would implement its Onshore Horizontal Directional Drill Contingency Plan to avoid or minimize the risk of drilling fluid release, as well as procedures that would be followed if an inadvertent release does occur. Because the waterbody crossings would be completed in accordance with the construction and restoration methods described above, Transco's Plan and Procedures, and any site-specific measures that may be required by federal agencies, we conclude that impacts on waterbodies would be minor and either temporary or short-term.

4.3.3 Offshore Surface Water Resources

This section describes state classifications and existing water quality in Raritan Bay, Lower New York Bay, and waters considered by the NYSDEC to be within the Atlantic Ocean. Section 2.3.3 includes a detailed description of the offshore construction methods that could impact offshore water resources, and section 4.5.2.8 details Project impacts on offshore water quality in relation to effects on marine wildlife, and describes the measures that Transco would implement to avoid and minimize impacts on offshore surface water resources.

4.3.3.1 Offshore Surface Water Beneficial Uses and State Classifications

New Jersey water classifications for the offshore portion of the Project would be the same as those described in section 4.3.2.4. The offshore segment of the Raritan Bay Loop would cross waters designated by the NJDEP as SE-1 (saline estuarine) and SC (coastal saline waters). SE-1 and SC waters are suitable for shellfish harvesting; maintenance, migration, and propagation of biota; and primary contact recreation. SE-1 and SC waters are not classified as high-quality waters by the NJDEP. The physical water quality standards that apply to the NJDEP water classifications as established in NJAC 7:9B are provided in table 4.3.3-1.

All waters in New York State are assigned a letter classification by the NYSDEC (6 New York Codes, Rules and Regulations (NYCRR) Part 701) that denotes their best uses. The offshore segment of the Raritan Bay Loop would cross waters designated by the NYSDEC as Class SA and SB. The best uses of Class SA waters are for shellfishing for market purposes, primary and secondary contact recreation, and fishing. These waters are also suitable for fish, shellfish, and wildlife propagation and survival. The best uses of Class SB water are primary and secondary contact recreation and fishing. These waters are also suitable for fish, shellfish, and wildlife propagation and survival. No waterbodies within the Raritan Bay Loop are designated as high quality by the NYSDEC. The physical water quality standards that apply to the NYSDEC water classifications as established in 6 NYCRR Part 703 are provided in table 4.3.3-1.

TABLE 4.3.3-1

Physical Water Quality Standards for Offshore Waters Crossed by the Northeast Supply Enhancement Project

Parameter	Water Class	Standard
New Jersey		
Bacterial quality (Counts/100)	SE-1, SC	Shellfish harvesting: Bacterial indicators shall not exceed, in all shellfish waters, the standard for approved shellfish waters as established by the National Shellfish Sanitation Program as set forth in its current manual of operations.
		Primary contact recreation: *Enterococci* levels shall not exceed a geometric mean of 35/100 mL, or a single sample maximum of 104/100 mL.
Dissolved oxygen (mg/L)	SE-1	24-hour average not less than 5.0, but not less than 4.0 at any time. Super-saturated dissolved oxygen values shall be expressed as their corresponding 100% saturation values for purposes of calculating 24-hour averages.
	SC	Not less than 5.0 at any time.
Floating, colloidal, color and settleable solids; petroleum hydrocarbons and other oils and grease	SE-1, SC	None noticeable in the water or deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota. None that would render the waters unsuitable for the designated uses.
Nutrients	SE-1, SC	Except as due to natural conditions, nutrients shall not be allowed in concentrations that render the waters unsuitable for the existing or designated uses due to objectionable algal densities, nuisance aquatic vegetation, diurnal fluctuations in dissolved oxygen or pH indicative of excessive photosynthetic activity, detrimental changes to the composition of aquatic ecosystems, or other indicators of use impairment caused by nutrients.
pH (standard units)	SE-1	6.5 – 8.5
	SC	Natural pH conditions shall prevail.
Radioactivity	SE-1, SC	Prevailing regulations including all amendments and future supplements thereto adopted by the EPA pursuant to Sections 1412, 1445, and 1450 of the Public Health Services Act, as amended by the Safe Drinking Water Act (PL 93-523).
Solids, Suspended (mg/L) (Non-filterable residue)	SE-1, SC	None of which would render the water unsuitable for the designated uses.
Solids, Total Dissolved (mg/L) (Filterable Residue)	SE-1	None that would render the water unsuitable for the designated uses.
Taste- and odor-producing substances	SE-1, SC	None offensive to humans or that would produce offensive taste or odors in water supplies and biota used for human consumption. None that would render the water unsuitable for the designated uses.
Temperature	SE-1	Temperatures shall not exceed 29.4 degrees Celsius (°C) summer seasonal average
	SC	No thermal alterations which would cause temperatures to exceed 26.7 °C Summer seasonal average
Toxic substances (general)	SE-1, SC	None, either alone or in combination with other substances, in such concentrations as to affect humans or be detrimental to the natural aquatic biota, produce undesirable aquatic life, or that would render the waters unsuitable for the designated uses.
		Toxic substances shall not be present in concentrations that cause acute or chronic toxicity to aquatic biota, or bioaccumulate within an organism to concentrations that exert a toxic effect on that organism or render it unfit for consumption.
		The concentrations of non-persistent toxic substances in the State's waters shall not exceed one-twentieth (0.05) of the acute definitive LC50 or EC50 value, as determined by appropriate bioassays conducted in accordance with NJAC 7:18.

TABLE 4.3.3-1 (cont'd)

Physical Water Quality Standards for Offshore Waters Crossed by the Northeast Supply Enhancement Project

Parameter	Water Class	Standard
		The concentration of persistent toxic substances in the State's waters shall not exceed one-hundredth (0.01) of the acute definitive LC50 or EC50 value, as determined by appropriate bioassays conducted in accordance with NJAC 7:18.
Copper (µg/L dissolved)	Site-specific TMDL for Raritan Bay	Acute: 7.9
		Chronic: 5.6
	SE-1, SC	Aquatic Acute: 4.8[c]
		Aquatic Chronic: 3.1[c]
Turbidity (Nephelometric Turbidity Unit [NTU])	SE-1	Maximum 30-day average of 10 NTU, a maximum of 30 NTU at any time.
	SC	Levels shall not exceed 10.0 NTU.
Ammonia, un-ionized (mg NH_3-N/L)	SE-1	0.115[a]; 0.030[b]
	SC	0.094[a]; 0.024[b]
Arsenic (µg/L)	SE-1, SC	Aquatic Acute: 69[c] (dissolved)
		Aquatic Chronic: 36[c] (dissolved)
		Human Health: 0.061[d] (total recoverable)
Barium (µg/L)	N/A	N/A
Cadmium (µg/L)	SE-1, SC	Aquatic Acute: 40[c] (dissolved)
		Aquatic Chronic: 8.8[c] (dissolved)
		Human Health: 16[e] (total recoverable)
Cobalt (µg/L)	N/A	N/A
Lead (µg/L dissolved)	SE-1, SC	Aquatic Acute: 210[c]
		Aquatic Chronic: 24[c]
Manganese (µg/L total recoverable)	SE-1, SC	Human Health: 100[e]
Selenium (µg/L)	SE-1, SC	Aquatic Acute: 290[c] (dissolved)
		Aquatic Chronic: 71[c] (dissolved)
		Human Health: 4,200[e] (total recoverable)
Silver (µg/L)	SE-1, SC	Aquatic Acute: 1.9[c] (dissolved)
		Human Health: 40,000[e] (total recoverable)
Vanadium (µg/L)	N/A	N/A
Mercury (µg/L)	SE-1, SC	Aquatic Acute: 1.8[c] (dissolved)
		Aquatic Chronic: 09.4[c] (dissolved)
		Human Health: 0.051[e] (total recoverable)
P,P'-DDE (µg/L)[f]	SE-1, SC	Human Health: 0.00022[d]
Sum of DDD + DDE + DDT[f]	N/A	N/A
Total polychlorinated biphenyls (PCBs) (µg/L)	SE-1, SC	Aquatic Chronic: 0.03
		Human Health: 0.000064[d]
1,2,4-Trichlorobenzene (µg/L)	SE-1, SC	Human Health: 42[e]
1,2-Dichlorobenzene (µg/L)	SE-1, SC	Human Health: 6,200[d]
Bis(2-Ethylhexyl) Phthalate (µg/L)	SE-1, SC	Human Health: 2.2[e]
Benzo(A)Anthracene (µg/L)	SE-1, SC	Human Health: 0.18[d]
Benzyl Butyl Phthalate (µg/L)	SE-1, SC	Human Health: 190[e]
Phenanthrene (µg/L)	N/A	N/A
Total Toxicity Equivalency Factor for Dioxins and Furans (µg/L)	SE-1, SC	Human Health: $5.1\text{x}10^{-9}$[d]

TABLE 4.3.3-1 (cont'd)

Physical Water Quality Standards for Offshore Waters Crossed by the Northeast Supply Enhancement Project

Parameter	Water Class	Standard
New York		
Taste-, color-, and odor-producing, toxic and other deleterious substances	SA, SB	None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages.
Turbidity	SA, SB	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	SA, SB	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and floating substances.	SA, SB	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
Garbage, cinders, ashes, oils, sludge and other refuse	SA, SB	None in any amounts.
Phosphorus and nitrogen	SA, SB	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
pH	SA, SB	The normal range shall not be extended by more than one-tenth (0.1) of a pH unit.
Dissolved oxygen	SA, SB	Chronic: Shall not be less than a daily average of 4.8 mg/L.
Total coliform (number per 100 mL)	SA	The median most probable number (MPN) value in any series of representative samples shall not be in excess of 70.
	SB	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively.
Fecal coliforms (number per 100 mL)	SB	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.
Arsenic (µg/L dissolved)	SA, SB	Aquatic Chronic: 63
Lead (µg/L)	SA, SB	Aquatic Chronic: 8
		Aquatic Acute: 204
Nickel (µg/L)	SA, SB	Aquatic Chronic: 8.2
		Aquatic Acute: 7.4
Silver (µg/L)	N/A	N/A
Zinc (µg/L dissolved)	SA, SB	Aquatic Chronic: 66
Mercury (µg/L dissolved)	SA, SB	Health (Fish Consumption): $7x10^{-4}$
		Wildlife: 0.0026
Total PCBs (µg/L)	SA, SB	Health (Fish Consumption): $1x10^{-6}$
		Wildlife: $1.2x10^{-4}$
Total Toxicity Equivalency Factor for Dioxins and Furans (µg/L)	SA, SB	Health (Fish Consumption): $6x10^{-10}$
		Wildlife: $3.1x10^{-9}$

[a] Acute aquatic life protection criterion.
[b] Chronic aquatic life protection criterion.
[c] Criterion is expressed as a function of the Water Effect Ratio. For criterion in the table, the Water Effect Ratio equates to the default value of 1.0.
[d] Human health carcinogen.
[e] Human health noncarcinogen.
[f] DDD = Dichlorodiphenyldichloroethane.
P,P'-DDE and DDE = Dichlorodiphenyldichloroethylene.
DDT = Dichlorodiphenyltrichloroethane.

4.3.3.2 Existing Offshore Water Quality

As described in section 4.3.2.4, a set of designated beneficial uses and water quality classifications have been developed for each state. Section 303(d) of the CWA requires each state to identify waters where current pollution control technologies alone cannot meet the water quality standards set for that waterbody. Every 2 years, states are required to submit a list of these impaired waters as well as any that may soon become impaired to EPA. The impaired waters are prioritized based on the severity of the pollution and the designated beneficial use of the waterbody. States must establish the TMDLs of the pollutant(s) for each impaired water.

Transco reviewed the list of 303(d) Impaired Waters for New Jersey and New York. Raritan Bay, Lower New York Bay, and the Atlantic Ocean are impaired for several beneficial uses as identified in table 4.3.3-2.

TABLE 4.3.3-2

Offshore Waterbody Impairments Crossed by the Northeast Supply Enhancement Project

Facility/State/Project/Waterbody	Milepost	Impaired Designated Use(s)	Pollutant(s) – 303(d) List
NEW JERSEY			
Raritan Bay - West of Thorns Creek	12.2 - 14.0	Fish Consumption	PAHs, Dieldrin, Dioxin, PCB, Chlordane, DDT
		Aquatic Life	Oxygen depletion, pH
		Shellfish	Total Coliform
Raritan Bay - Deep Water	26.6 – 28.3	Aquatic Life	Cause unknown
		Fish Consumption	PAHs, Dieldrin, Dioxin, Mercury/PCBs/ Chlordane/DDT in Fish Tissue
		Shellfish Harvesting	Total Coliform
Atlantic Ocean coastline from Sandy Hook Bay to Navesink River	28.3 - 30.6	Aquatic Life	Oxygen Depletion
		Fish Consumption	PCBs in Fish Tissue
NEW YORK			
Raritan Bay, East (Class SB)	14.0 – 15.5	Fish Consumption	Priority Organics (PCBs)
Raritan Bay, West (Class SA)	15.5 – 19.6	Fish Consumption,	Priority Organics (PCBs, dioxins)
		Shellfish Harvesting	Pathogens
Lower New York Bay	19.6 – 26.6	Fish Consumption	Priority Organics (PCBs),
Atlantic Ocean coastline from Rockaway Point to the Queens/Nassau border [a]	30.6 – 35.5	Shellfish Harvesting	Pathogens

[a] Includes a short segment of the Raritan Bay Loop between MPs 19.6 and 26.6.

Sources: NJDEP, 2014a, 2014b; NYSDEC, 2015, 2016a, 2016b; PADEP, 2016a.

Key:

PAH = polycyclic aromatic hydrocarbons.

PCB = polychlorinated biphenyls.

DDT = Dichlorodiphenyltrichloroethane.

Offshore water quality in the Project area is influenced by many physical factors, including freshwater and sediment inputs, tides, wind, shipping, and geographic characteristics. The NJDEP Bureau of Marine Water Monitoring monitors water quality within Raritan Bay, generally measuring at the surface of the water column. Water quality data for 1989 through 2007 was collected by the NJDEP as part of the New Jersey Costal Water Monitoring program at three sampling sites that are near the Project route (NJDEP, 2004). In addition, the New York City Department of Environmental Protection (NYCDEP) collected water quality data between 2008 and 2016 at three monitoring stations that are nearer to the proposed Raritan Bay Loop route; however, this monitoring effort provided data for fewer impairments than the NJDEP monitoring. The parameters and results of these water quality surveys are presented in table 4.3.3-3.

Transco conducted a field survey from October through December 2016 to evaluate water quality and sediment characteristics along the proposed Raritan Bay Loop route. The water and sediment sampling were conducted in accordance with an Offshore Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) that was developed by Transco and submitted to the NJDEP and NYSDEC for review and comment.[23] Water quality properties, including dissolved oxygen, temperature, salinity, turbidity, pH, and conductivity, were collected at 69 sampling locations along the proposed offshore route. The water quality survey results are summarized below, and sediment sampling results are discussed in section 4.5.2.8.

- Dissolved Oxygen: The average measured dissolved oxygen value along the entire proposed route was 8.56 mg/L and the concentration ranged from 4.69 mg/L to 11.88 mg/L.

- Salinity: The average measured salinity along the entire proposed route was 28.72 practical salinity units (PSU) and salinity ranged from 12.33 PSU to 34.73 PSU.

- Turbidity: The average measured turbidity along the entire proposed route was 9.74 nephelometric turbidity units (NTU) and turbidity ranged from 0.39 NTU to 27.78 NTU.

- pH: The average measured pH along the entire proposed route was 7.98, and pH ranged from 5.87 to 8.30.

- Conductivity: The average measured conductivity along the entire proposed route was 31.37 millliSiemens per centimeter (mS/cm) and conductivity ranged from 12.46 mS/cm to 38.54 mS/cm.

4.3.3.3 General Impacts, Mitigation, and Conclusions

Section 4.5.2.8 includes our discussion of Project impacts on offshore water quality in relation to effects on marine wildlife, and describes the measures that Transco would implement to avoid and minimize impacts on offshore surface water resources.

[23] Transco's Offshore Environmental Sampling Report, including the SAP/QAPP, can be found under FERC Accession No. 20170630-5374 by opening the file named "Vol 1 NESE Environ Rpts Att 4.pdf."

TABLE 4.3.3-3

Historical Offshore Waterbody Impairments Crossed by the Northeast Supply Enhancement Project

Parameter	Number of Samples	Maximum	Average	Minimum
New Jersey Costal Water Monitoring Program (monthly averages between 1989 and 2007)				
Station 26A (Lat 40.47, Long -74.17)				
Temperature (°C)	33	25.5	13.7	3.0
Secchi (m)	30	7.0	3.8	2.0
Salinity (parts per thousand)	33	29.1	22.2	10.6
Dissolved Oxygen (mg/l)	32	12.2	7.9	3.4
Suspended Solids (mg)	26	37.5	20.5	3.0
Ammonia (µg N/L)	32	716.1	239.7	10.5
NO_3 and NO_2 (µg N/L)	33	3,159.0	435.4	9.5
Orth-phosphate (µg P/L)	33	157.6	65.3	11.0
Total Nitrogen (µg N/L)	33	3,451.6	968.9	164.4
Fecal Coliform (MPN/100mL)	19	430.0	34.6	3.0
Chlorophyll-a (µg/L)	18	26.9	8.3	0.4
Enterococcus bacteria (CFU/100mL)	12	7.0	3.3	3.0
Total Phosphorus (µg/L)	14	178.7	102.6	13.9
Station 66 (Lat 40.46, Long -74.10)				
Temperature (°C)	39	25.5	14.3	3.0
Secchi (m)	37	7.0	3.9	1.0
Salinity (parts per thousand)	39	29.6	23.2	10.7
Dissolved Oxygen (mg/l)	38	12.8	8.5	4.9
Suspended Solids (mg)	31	44.0	21.0	5.0
Ammonia (µg N/L)	38	671.7	189.3	5.9
NO3 and NO2 (µg N/L)	39	2,386.9	327.0	15.5
Orth-phosphate (µg P/L)	39	137.0	57.9	6.4
Total Nitrogen (µg N/L)	39	2,655.5	864.7	279.6
Fecal Coliform (MPN/100mL)	23	93.0	12.0	3.0
Chlorophyll-a (µg/L)	21	41.2	11.6	0.4
Enterococcus bacteria (CFU/100mL)	14	43.0	5.9	3.0
Total Phosphorus (µg/L)	17	217.9	96.4	36.7
Station 918 (Lat 40.46, Long -74.04)				
Temperature (°C)	41	25.5	13.4	3.0
Secchi (m)	39	10.0	4.4	2.0
Salinity (parts per thousand)	40	30.4	24.9	13.0
Dissolved Oxygen (mg/l)	41	13.3	7.9	3.6
Suspended Solids (mg)	34	57.2	22.7	8.0
Ammonia (µg N/L)	38	362.5	132.4	6.0
NO3 and NO2 (µg N/L)	41	1,805.4	226.7	6.7
Orth-phosphate (µg P/L)	40	108.1	46.4	5.5
Total Nitrogen (µg N/L)	40	2,045.0	677.7	151.9
Fecal Coliform (MPN/100mL)	23	23.0	4.4	3.0
Chlorophyll-a (µg/L)	23	73.8	10.6	0.4
Enterococcus bacteria (CFU/100mL)	15	3.0	3.0	3.0
Total Phosphorus (µg/L)	19	141.4	74.0	24.9

TABLE 4.3.3-3 (cont'd) **Historical Offshore Waterbody Impairments Crossed by the Northeast Supply Enhancement Project**				
Parameter	Number of Samples	Maximum	Average	Minimum
NYCDEP Harbor Monitoring Data (monthly averages between 2008 and June 2018)				
Station K5A (Lat 40.48, Long -74.24)				
Secchi (feet)	21	5.9	3.5	1.8
Dissolved Oxygen (mg/L)	19	11.9	8.4	5.4
Fecal Coliform (number/100mL)	20	477.9	53.0	2.3
Enterococcus bacteria (number/100mL)	21	166.5	21.0	1.8
Total Suspended Solids (mg/L) [a]	8	22.7	10.7	4.2
Chlorophyll-a (µg/L) [a]	8	38.7	14.5	2.6
Station K6 (Lat 40.51, Long -74.10)				
Secchi (feet)	21	7.1	4.0	2.3
Dissolved Oxygen (mg/L)	18	13.7	9.4	6.4
Fecal Coliform (number/100mL)	21	114.7	12.1	1.0
Enterococcus bacteria (number/100mL)	19	165.4	7.2	1.0
Total Suspended Solids (mg/L) [a]	7	21.5	9.6	3.6
Chlorophyll-a (µg/L) [a]	7	44.8	17.4	3.6
Station N16 (Lat 40.52, Long -73.94)				
Secchi (feet)	21	12.8	7.4	3.6
Dissolved Oxygen (mg/L)	17	10.3	8.4	6.4
Fecal Coliform (number/100mL)	17	102.0	8.4	1.0
Enterococcus bacteria (number/100mL)	17	14.7	2.3	1.0
Total Suspended Solids (mg/L) [a]	7	20.1	9.2	3.7
Chlorophyll-a (µg/L) [a]	7	15.6	7.2	2.7

[a] Represents results from 2008 through 2011. Results from 2012 through 2018 are not publicly available.

Sources: NJDEP, 2003a; 2003b; 2003c; NYCDEP 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018.

4.3.4 Wetlands

Wetlands are defined as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and in normal conditions do support, a prevalence of vegetation adapted for life in saturated soil conditions (USACE, 1987; Federal Interagency Committee for Wetland Delineation, 1989). Wetlands serve a multitude of functions and values, including, but not limited to, groundwater recharge/discharge, flood flow alteration, sediment and shoreline stabilization, sediment and toxicant retention, nutrient storage and removal, nutrient production export, recreational value, education and scientific value, promoting floral biodiversity and interspersion, and serving as habitat for fish, shellfish, and wildlife (including threatened or endangered species; USACE, 1999).

Wetlands impacted by the Project are federally and state-regulated. At the federal level, the USACE regulates wetlands under section 404 of the CWA and section 10 of RHA, and the EPA has the authority to review (or veto) any section 404 permits issued by the USACE (see section 1.2.3). The EPA has delegated authority to PADEP and NJDEP to issue water quality certificates under section 401 of the CWA as part of the Freshwater Wetlands Protections Act (FWPA).

4.3.4.1 Wetland Resources

The Project would cross four wetland types, as described by Cowardin et al. (1979), as well as vernal pool wetlands. These include palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and estuarine intertidal emergent (E2EM) wetlands. The basic wetland types include:

- PEM – includes all nontidal wetlands characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.

- PSS – includes all nontidal wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.

- PFO – includes all nontidal wetlands characterized by woody vegetation that is 20 feet or taller.

- E2EM – consists of deepwater tidal habitats and tidal wetlands that are semi-enclosed by land but have access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

- Vernal Pools – vernal pools are characterized by seasonally fluctuating water levels and may dry out completely in the summer. Many vernal pools are small, shaded, and unvegetated, and the pond bottoms are covered in dead leaves and algae. These areas can provide critical breeding habitat for several species of amphibians and are also an important habitat for many species of birds, mammals, reptiles, and invertebrates. Additional discussion of vernal pools is provided below.

Table 4.3.4-1 provides the location and classification of each wetland affected by the Project, including the area (acreage) of each wetland that would be impacted by construction and operation activities. PEM wetlands are the most common type of wetlands that would be impacted by construction of the Quarryville and Madison Loops. Some of the wetlands that would be impacted occur in conjunction with other wetland types, known as wetland complexes; for example, several of the PEM wetlands that would be impacted occur in conjunction with other wetland types (PSS, PFO, or E2EM). Construction of Compressor Station 206 would impact two wetland complexes. No wetlands would be impacted by construction at Compressor Station 200 or the Raritan Bay Loop.

Quarryville Loop

The dominant vegetation species identified during field surveys within PEM wetlands are redtop grass (*Agrostis* spp.), fox sedge (*Carex vulpinoidea*), spotted jewelweed (*Impatiens capensis*), softrush (*Juncus effusus*), Japanese stilt-weed (*Microstegium vimineum*) and reed canary grass (*Phalaris arundinacea*). In PSS wetlands, the dominant species are spicebush (*Lindera benzoin*), and arrowwood (*Viburnum* spp.), spotted jewelweed, and Japanese stilt-weed. The dominant vegetation species identified during field surveys within PFO wetlands are pin oak (*Quercus palustris*), red maple (*Acer rubrum*), and spicebush.

Madison Loop

The dominant herbaceous species identified for PEM wetlands within the Madison Loop include redtop, sedge species (*Carex spp.*), Pennsylvania smartweed (*Polygonum pensylvanica*), arrow-leaf tearthumb (*Persicaria sagittata*), common reed (*Phragmites australis*), and reed canary grass. The dominant vegetation species identified during field surveys within PSS wetlands are spicebush, arrowwood, spotted jewelweed, and Japanese stilt-weed. Common vegetation within PFO wetlands include sweetgum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), and red maple. Switchgrass (*Panicum virgatum*) and common reed were the dominant species noted in E2EM wetlands.

TABLE 4.3.4-1

Wetlands within the Northeast Supply Enhancement Project Workspaces

State/Facility/ Location/ Wetland ID	MP	Project Component	Wetland Classification	Crossing Length (ft) [a]	Total Wetland Impacts (acre)									
					PEM		PSS		PFO		E2EM [b]		TOTAL	
					Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
PENNSYLVANIA														
Quarryville Loop														
Lancaster County														
Drumore Township														
W-T02-006A-1	1681.9	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T02-012A-1, B-1, C-1 [c]	1683.5	Pipeline	PEM/PSS	75	0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
W-T02-008A-1, A-2, B-1 [c]	1685.0	Pipeline	PEM/PSS	121	0.2	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0
East Drumore Township														
W-T02-001A-2, B-1, C-1 [c]	1685.7	Pipeline	PEM/PSS/PFO	272	0.5	0.0	<0.1	0.0	<0.1	<0.1	0.0	0.0	0.5	<0.1
W-T02-005A-1 [c]	1687.4	Pipeline	PEM	27	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T02-009A-1, A-2 [c]	1688.1	Pipeline	PEM	228	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
W-T02-010A-1, B-1 [c]	1688.5	Pipeline	PEM/PSS	342	0.4	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.5	<0.1
W-T06-001A-1 [c]	1688.7	Pipeline	PEM	112	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
W-T06-003A-1	1689.4	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
Eden Township														
W-T02-011A-1 [c]	1690.5	Pipeline	PEM	48	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
W-T06-004A-1 [c]	1690.9	Pipeline	PEM	220	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Pennsylvania/Quarryville Loop Subtotal					2.3	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0	2.5	<0.1
NEW JERSEY														
Madison Loop														
Middlesex County														
Old Bridge Township														
W-T01-008A-1 [c]	8.6	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T01-006A-1	8.7	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T01-007A-1 [c]	8.7	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T15-001A-1	8.7	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T01-003A-1, C-1	8.8	Pipeline	PEM/PFO	186	<0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.3	0.1
W-T01-009A-1	8.9	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0

TABLE 4.3.4-1 (cont'd)

Wetlands within the Northeast Supply Enhancement Project Workspaces

State/Facility/ Location/ Wetland ID	MP	Project Component	Wetland Classification	Crossing Length (ft) [a]	Total Wetland Impacts (acre)									
					PEM		PSS		PFO		E2EM [b]		TOTAL	
					Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
W-T01-010C-1[c, d]	9.0	Pipeline	PFO	33	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	<0.1	0.0
W-T15-003C-1 [c]	9.2	Pipeline	PEM/PFO	N/A	<0.1	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.1	0.0
W-T15-003A-1[c, d]	9.2	Pipeline	PEM/PFO	171	0.4	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.4	0.0
W-T15-002A-1 [c]	9.3	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T15-004C-1 [c]	10.1	Pipeline	PFO	1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1
W-T01-014A-1, B-1, C-1 [c]	10.1	Pipeline	PEM/PSS/PFO	332	0.5	0.0	<0.1	0.0	<0.1	<0.1	0.0	0.0	0.5	<0.1
W-T01-015A-1	10.2	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
Sayreville Township														
W-T01-012D-1	10.7	Workspace	E2EM	N/A	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	<0.1	0.0
W-T01-011A-1 [c]	10.8	Pipeline	PEM	371	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
W-T07-002A-1 [c]	10.9	Workspace	PEM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
W-T07-003A-1, B-1 [c]	11.4	Pipeline	PEM/PSS	421	0.4	0.0	0.3	<0.1	0.0	0.0	0.0	0.0	0.7	<0.1
W-T07-004D-1[c, e]	11.5	Pipeline	E2EM	306	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
W-T07-004D-1[c, d, e]	11.5	Pipeline	E2EM	500	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	0.0
W-T01-017D-1 [c]	11.8	Pipeline	PEM/E2EM	N/A	<0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0
W-T01-017A-1, D-1 [c, d]	11.8	Pipeline	PEM/E2EM	107	0.2	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	0.3	0.0
Madison Loop Subtotal					2.5	0.0	0.3	0.1	0.4	0.1	3.0	0.0	6.1	0.2
Compressor Station 206														
Somerset County														
Franklin Township														
W-T09-001	N/A	Facility	PEM/PFO	N/A	0.5	0.3	0.0	0.0	0.6	0.6	0.0	0.0	1.0	0.9
W-T09-002	N/A	Access Road/ Interconnect	PEM/PSS/PFO	N/A	0.5	0.5	0.3	0.3	2.1	2.1	0.0	0.0	2.9	2.9
Compressor Station 206 Subtotal					0.9	0.8	0.3	0.3	2.6	2.6	0.0	0.0	3.9	3.7
New Jersey Subtotal					3.4	0.8	0.6	0.4	3.0	2.7	3.0	0.0	10.0	3.9
Project Total					5.7	0.8	0.6	0.4	3.0	2.7	3.0	0.0	12.5	3.9

TABLE 4.3.4-1 (cont'd)

Wetlands within the Northeast Supply Enhancement Project Workspaces

State/Facility/ Location/ Wetland ID	MP	Project Component	Wetland Classification	Crossing Length (ft) [a]	Total Wetland Impacts (acre)									
					PEM		PSS		PFO		E2EM [b]		TOTAL	
					Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.

[a] Crossing length indicates the length of the wetland where it would be crossed by the pipeline. "N/A" indicates that the wetland is within the Project workspaces but would not be crossed by the pipeline centerline.

[b] E2EM wetlands would be restored to preconstruction conditions.

[c] A portion of this wetland is within Transco's existing right-of-way.

[d] Foot traffic only, associated with placement of the HDD tracking wires.

[e] Portion of wetland has been filled with marina basin sediment.

Key:
E2EM = Estuarine Intertidal Emergent
N/A = Not Applicable
PEM = Palustrine Emergent
PFO = Palustrine Forested
PSS = Palustrine Scrub/Shrub
Note: Sum of addends may not match due to rounding.

Compressor Station 206

The dominant vegetation species identified during field surveys within PEM wetlands are redtop, sedge species, Pennsylvania smartweed, arrow-leaf tearthumb, reed canary grass, and common reed. In PSS wetlands, the dominant species are spicebush, arrowwood, spotted jewelweed, and Japanese stilt-weed. Within PFO wetlands, the representative species include red maple, sweetgum, and blackgum.

Vernal Pools

The Quarryville Loop would cross one vernal pool wetland in Pennsylvania (WB-T02-012 at MP 1683.5), which is under review through the USACE/PADEP Joint Permit Application process. No vernal pools would be crossed by the Project in New Jersey.

4.3.4.2 State Wetland Classification and Regulation

Pennsylvania

In Pennsylvania, wetland delineations were conducted within the Project workspace in accordance with the 1987 USACE Wetlands Delineation Manual (Environmental Laboratory, 1987), as well as the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (USACE, 2012a), and using Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al.,1979). Transco also classified wetlands meeting exceptional value criteria pursuant to 25 Pennsylvania Code §105.17, as defined, a wetland that meets one or more of the following criteria:

- serves as habitat for fauna or flora listed as threatened or endangered under the ESA, Pennsylvania's Wild Resource Conservation Act (32 P.S. § § 5301—5314), 30 Pennsylvania Code (relating to the PAFBC), or 34 Pennsylvania Code (relating to the Pennsylvania Game and Wildlife Code);

- hydrologically connected to or located within 0.5 mile of wetlands identified under subparagraph 1 (above), and that maintain the habitat of the threatened or endangered species within the wetland identified under subparagraph 1 (above);

- located in or along the floodplain of the reach of a wild trout stream or waters listed as exceptional value under Chapter 93 (relating to water quality standards) and the floodplain of streams tributary thereto, or wetlands within the corridor of a waterway or body of water that has been designated as a National Wild and Scenic River in accordance with the Wild and Scenic Rivers Act of 1968 (or designated as wild or scenic under the Pennsylvania Scenic Rivers Act (32 P.S. § § 820.21—820.29);

- located along an existing public or private drinking water supply, including both surface water and groundwater sources, that maintain the quality or quantity of the drinking water supply; and

- located in areas designated by the Department as natural or wild areas within state forest or park lands, wetlands located in areas designated as federal wilderness areas under the Wilderness Act or the Federal Eastern Wilderness Act of 1975, or wetlands located in areas designated as National Natural Landmarks by the Secretary of the Interior under the Historic Sites Act of 1935.

New Jersey

In New Jersey, wetland delineations were conducted in accordance with the 1989 Federal Interagency Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation 1989), and in areas inside of the Upper Wetlands Boundary, wetland delineations were conducted in accordance with the 1987 USACE Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE, 2010).

Under New Jersey's FWPA, New Jersey Statutes Annotated (NJSA) 13:9B, NJAC 7:7A, a permit is required from the NJDEP for certain activities in freshwater wetlands and state open waters as well as in transition areas adjacent to the wetlands. Wetland permits under the FWPA are based on a classification system that distinguishes wetlands based on their resource value (see NJSA 13:9B-7, NJAC 7:7A-2). There are three types of wetlands based on this classification system: exceptional resource value wetlands, ordinary resource value wetlands, and intermediate resource value wetlands:

- Exceptional resource value wetlands are those that discharge into FW1 or FW2-TP1 waters and their tributaries or that contain or have been documented to contain habitat for threatened or endangered species;

- Ordinary resource value wetlands are those that do not serve as habitat for threatened or endangered species or are associated with FW1 or FW2-TP waters and are either isolated wetlands, smaller than 5,000 square feet, or man-made drainage ditches, swales, or detention facilities; and

- Intermediate resource value wetlands are all other wetlands in the state not fitting the definition of an exceptional or ordinary resource value.

Table 4.3.4-2 lists the exceptional value or high-quality wetlands crossed by the Project and includes the resource value classification for each. No exceptional value or high-quality wetlands would be affected by Compressor Station 206, and no wetlands would be affected by Compressor Station 200.

4.3.4.3 General Impacts and Mitigation Measures

General Wetland Impacts

As indicated in table 4.3.4-1, construction and operation of the Project would temporarily and permanently affect 12.5 and 3.9 acres of wetlands, respectively. Of the 12.5 acres of wetlands affected during construction, 5.7 acres (47 percent) consist of PEM wetlands, 3.0 acres (24 percent) consist of PFO wetlands, 3.0 acres (24 percent) consist of E2EM wetlands, and 0.6 acre (5 percent) consists of PSS wetlands. Of the 3.9 acres of wetlands affected by operation of the NESE Project, 2.7 acres (69 percent) consist of PFO wetlands, 0.8 acre (21 percent) consist of PEM wetlands, and 0.4 acre (10 percent) consists of PSS wetlands.

TABLE 4.3.4-2

Exceptional Value or High-Quality Wetlands Affected by the Northeast Supply Enhancement Project

Wetland ID	Milepost	Wetland Type	EV/FWPA Classification
PENNSYLVANIA			
Quarryville Loop			
W-T02-006	1681.9	PEM	Wetlands that serve as threatened or endangered species habitat.
W-T02-008	1685.0	PEM/PSS	Wetlands that serve as threatened or endangered species habitat.
W-T02-001	1685.7	PEM/PSS/PFO	Wetlands that serve as threatened or endangered species habitat.
W-T02-010	1688.5	PEM/PSS	Wetlands that serve as threatened or endangered species habitat.
W-T06-001	1688.7	PEM	Wetlands that serve as threatened or endangered species habitat.
NEW JERSEY			
Madison Loop			
W-T15-004	10.1	PFO	Discharges into a FW2 waterway.
W-T01-014	10.1	PEM/PSS/PFO	Discharges into a FW2 waterway.
W-T01-012	10.7	E2EM	Discharges into a FW2 waterway.
W-T07-001	10.9	E2EM	Discharges into a FW2 waterway.
W-T07-004 [a, b]	11.5	E2EM	Discharges into a FW2 waterway.
W-T01-017 [b]	11.8	PEM/E2EM	Discharges into a FW2 waterway.

[a] Wetland crossed by HDD and open-cut.

[b] Foot traffic only, associated with placement of the HDD tracking wires.

Key:
E2EM = Estuarine intertidal emergent
PEM = Palustrine emergent
PFO = Palustrine forested
PSS = Palustrine scrub-shrub
EV = Exceptional Value
FWPA = Freshwater Wetlands Protection Act

Construction of the NESE Project would directly affect wetland soils, vegetation, and habitats, and could affect hydrology characteristics. Compaction and rutting of soils during construction could alter natural hydrologic patterns of the wetlands and potentially inhibit seed germination and regeneration of vegetation species. Reduced biological productivity could also result if topsoil and subsoil become mixed or if invasive vegetative species are introduced. Construction clearing activities and disturbance of wetland vegetation could also temporarily affect the wetland's capacity to buffer flood flows and/or control erosion. Construction could also impact wetland water quality, including changes in temperature, biochemistry, or water chemistry; increased turbidity and sedimentation; release of hazardous materials (e.g., fuels, lubricants); or addition of nutrients. Generally, direct impacts on wetlands would be the greatest during and immediately following construction, with wetland vegetation eventually transitioning back into a community with a function similar to that of preconstruction conditions. Emergent wetlands would typically recover to preconstruction conditions within 1 to 2 years, and scrub-shrub wetlands could take 2 to 4 years, depending on the age and complexity of the system. Impacts on forested wetlands would be much longer, and may include changes in the density, type, and biodiversity of vegetation. Given the species that dominate the forested wetlands crossed by the Project, recovery to preconstruction conditions may take up to 30 years or more. Project construction could also result in secondary and indirect effects on adjacent or nearby wetlands, such as sedimentation or habitat loss due to microclimate changes following clearing of forested vegetation. Secondary and indirect impacts would generally diminish with distance and time from the construction work area. Direct and indirect impacts of Project construction on wildlife that utilize wetland habitats is discussed in section 4.5.1.

As noted above, operation of the proposed facilities would permanently impact 3.9 acres of wetlands due to vegetation maintenance along the proposed pipeline loops and in conjunction with the access road to Compressor Station 206, discussed below. Vegetation within pipeline rights-of-way is maintained to ensure that the pipeline facilities are readily evident to the public and to allow for periodic visual inspection and corrosion and leak detection surveys. In compliance with our Procedures, Transco would maintain wetland vegetation in an herbaceous state within a 10-foot-wide strip centered over the pipeline on an annual or more frequent basis, if necessary. As such, emergent wetland vegetation within PEM and E2EM wetlands in the right-of-way would not be permanently affected because the vegetation would not generally be mowed or otherwise maintained. Vegetation within PSS wetlands would also be allowed to regenerate across the right-of-way, accept within the 10-foot-wide strip which would be maintained in an herbaceous state. Most of the permanent impacts on wetland vegetation would be in forested wetlands where trees within 15 feet of the pipeline centerline would be selectively cut and removed once every 3 years to ensure integrity of the pipeline facilities. Of the 2.7 acres of permanent PFO wetland impacts, 2.6 acres would be considered type conversions (e.g., forested habitat within PFO wetlands that are cleared and converted to PEM or PSS wetlands). Therefore, by maintaining the right-of-way and limiting revegetation of a portion of scrub-shrub and forested wetlands, some of the functions (primarily habitat) of these wetlands would be permanently altered by conversion to scrub-shrub and/or emergent wetlands. In addition to the impact on wetland vegetation during Project operation, the installation of the pipeline loops and other Project facilities could affect wetland hydrology on a permanent basis.

Federal and state agencies require that a three-step process be followed when proposing a project that may impact wetlands. The first step is to design the project to avoid wetland impacts to the extent practicable. In the second step, for projects where wetland impacts cannot be practically avoided, wetland impacts must be minimized to the greatest extent practicable. In the third step, if permanent impacts on wetlands are unavoidable, wetland replacement or compensatory mitigation is required to replace lost wetland function.

Wetland Avoidance

Consistent with state and federal guidelines and regulations, Transco routed the onshore pipeline facilities to avoid wetlands to the extent practicable. More specifically and as detailed in section 4.7.1.1, the pipeline loops would be collocated with Transco's existing right-of-way for 98 percent of their length, which would allow Transco to utilize up to 100 feet of its existing, maintained right-of-way during construction and to typically utilize 25 feet of its existing right-of-way during operation. Thus, routing the proposed pipeline facilities adjacent to existing pipelines substantially reduces construction and operation land requirements, including on wetlands, compared to greenfield pipeline routing, which would establish a new, 50-foot-wide permanently maintained right-of-way in areas currently unaffected by pipeline facilities. The ancillary facilities (e.g., MLVs, launchers/receivers, and CP systems) were also sited to avoid wetland impacts, and construction at existing Compressor Station 200 would not impact wetlands. Construction and operation at new Compressor Station 206 would impact 3.9 and 3.7 acres of wetlands, respectively, of which 2.9 acres (75 percent) would be impacted by the access road or inlet and outlet pipes associated with the facility. As required by our Procedures, Transco sited the compressor station itself to avoid construction and operation within wetlands, but wetland impacts could not be completely avoided by the access road or inlet and outlet pipelines due to the extent of wetlands between the facility and Transco's existing pipeline system and land use limitations near the access road, including residences and the Higgins Farm Superfund site to the north, and the active Trap Rock quarry to the south.

In addition to siting the proposed facilities to avoid impacts on wetlands to the extent practicable, Transco also located the ATWS needed to construct the Project to avoid wetlands, and would utilize the HDD method to specifically avoid permanent impacts on wetlands and waterbodies at two locations along the Madison Loop (the Cheesequake Road HDD and the Lockwood Marina HDD; see table 2.3.2-1). As discussed in sections 2.2.3 and 4.7.1.1 and detailed in appendix D, Transco identified over 200 individual ATWS required to safely support construction along the pipeline routes and at aboveground facilities.

During our review of the NESE Project, Transco complied with our recommendation to relocate and/or modify several ATWS to avoid and further minimize wetland impacts. Transco was able to avoid placing ATWS within 50 feet of a wetland boundary except at 16 locations where site-specific conditions would not provide for the setback (see table 2.3-2). Eight of the 16 ATWS would remain outside of wetlands whereas the remaining 8 ATWS would be within delineated wetlands. Use of these eight ATWS within wetland boundaries would temporarily impact about 2.2 acres of wetlands during construction, none of which would be retained for operation of the Project. We reviewed each location and determined that the 16 ATWS within 50 feet of a wetland or waterbody boundary were justified.

Impact Minimization

Where wetlands could not be avoided, Transco would minimize impacts and restore the construction right-of-way by implementing its construction and restoration plans and complying with conditions of section 404 and 401 permits that may be issued for the Project. As described in section 2.3.2.2, wetland construction and restoration would be conducted in accordance with Transco's Procedures (see appendix F). The following procedures would be implemented to minimize impacts on wetlands, some of which are discussed in more detail below:

- using a reduced, 75-foot-wide construction right-of-way through wetlands;
- limiting construction equipment travel and operation within wetlands;
- utilizing timber mats to support equipment in inundated or saturated wetlands;
- installing erosion and sediment control devices, as necessary (e.g., trench breakers, slope breakers, silt fences, and/or stacked hay bales);
- segregating the top 12 inches of topsoil excavated from the trench line in non-saturated wetlands and returning it to the appropriate horizon upon backfill of the trench;
- reducing tree clearing in forested wetlands and limiting necessary vegetation maintenance within wetlands as described above;
- sealing the trench line at upland/wetland boundaries to maintain wetland hydrology;
- storing hazardous materials and prohibiting parking or refueling of vehicles within a minimum of 100 feet from any wetland boundary;
- implementing Transco's Spill Plan to further reduce the potential for a hazardous material spill to occur, and to minimize the effects of any spills;
- implementing procedures to prevent the introduction and spread of invasive species during construction and performing post-construction invasive species monitoring and control; and
- restoring pre-construction contours to the extent practicable.

Vegetation clearing in wetlands would be limited to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. Stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trenchline in order to avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland. Grading would be limited in wetland areas to the extent practicable. Transco would limit the type of equipment (e.g., low ground pressure equipment, trenching and backfilling equipment) allowed to access wetland areas, and would implement weight dispersing devices such as timber mats to proactively address compaction and rutting issues. Additionally, machinery would operate on one side of the trench (working side), and excavated materials would be stockpiled on the other (nonworking side).

Sediment barriers, such as silt fence and staked straw bales, would be installed and maintained adjacent to wetlands and within ATWS as necessary to minimize the potential for sediment runoff. Sediment barriers would be installed across the full width of the construction right-of-way at the base of slopes adjacent to wetland boundaries. Sediment barriers would be properly maintained throughout construction and reinstalled as necessary or until permanent erosion controls are installed or restoration of adjacent upland areas is complete. Wetland hydrology would be maintained by installing trench breakers at the wetland/upland boundary, sealing the trench bottom where necessary, and by restoring wetlands to original contours without adding new drainage features that were not present prior to construction. Prior to backfilling, Transco would install permanent trench breakers where necessary to prevent the subsurface drainage of water from wetlands.

As noted above and as detailed in section 2.3.2.1, Transco would implement the HDD method to specifically avoid direct impacts on wetlands along the Madison Loop. The HDD method could result in an inadvertent release of drilling fluid into a wetland. Transco would use a drilling fluid composed of 95 to 98 percent water and 2 to 5 percent bentonite, a naturally occurring clay mineral. Bentonite-based drilling fluid is a non-toxic, non-hazardous material that is also used to construct potable water wells throughout the United States. If needed to optimize drilling operations, Transco may augment the drilling fluid with starch, cellulose, non-toxic polymers, and/or crystalline silica. In general, the additives would be NSF/ANSI 60 approved. The primary impact that an inadvertent release would have on wetlands would be increased sedimentation and turbidity. Transco would implement its Onshore Horizontal Directional Drilling Contingency Plan that details the potential for an inadvertent release to occur; explains the drilling practices that would be implemented in the event of an inadvertent release; and describes the measures that would be undertaken, in consultation with the appropriate regulatory agencies, if drilling fluid was to impact a wetland (see section 2.3.2.1).

Wetland Mitigation

The USACE and designated state agencies require mitigation for unavoidable wetland impacts to preserve no net loss of wetland function. In Pennsylvania, the USACE Baltimore District issued its Section 404 permit on May 29, 2018 and determined that no mitigation was required for wetland impacts associated with the Quarryville Loop, and on October 26, 2017 the PADEP issued an Administrative Jurisdictional Determination indicating that a wetland permit was not required for Transco's proposed activities at Compressor Station 200. In New Jersey, the USACE New York District does not require compensatory mitigation for Project-related wetland impacts under its jurisdiction (see section 1.2.3), but Transco is continuing to consult with the NJDEP regarding potential mitigation for wetland impacts under its jurisdiction. Transco, in consultation with the NJDEP, would prepare a Project-specific wetland mitigation plan to maintain no net loss of wetlands and to adequately replace lost functions. As a part of the federal and state permitting processes, written approval of the mitigation plan would be obtained from the appropriate agencies prior to construction.

4.3.4.4 Conclusion

We conclude that implementing the above described Project routing, workspace design, and construction methods would avoid impacts on wetlands to the extent practicable, and that by constructing the Project in accordance with Transco's Procedures and other plans, direct and indirect wetland impacts would be minimized, and most impacts would be minor and temporary or short-term. In addition, wetland impacts that could not be avoided would be mitigated in accordance with wetland compensatory mitigation plans as approved by applicable agencies. Therefore, construction and operation of the NESE Project would not result in significant impacts on wetland resources.

4.4 VEGETATION

4.4.1 Vegetation Resources

The major upland cover types crossed by the Project in Pennsylvania and New Jersey include upland forest and open upland and are summarized in tables 4.4.1-1 and 4.4.1-2, respectively. Developed land, which is not included in this section, consists of residential, commercial, and industrial lands, and roadways, all of which are generally devoid of native vegetation and provide little habitat value (see section 4.7). Wetland vegetation communities that would be affected by the Project are discussed in section 4.3.4 and submerged vegetation resources that would be affected by the offshore segment of the Raritan Bay Loop are discussed in section 4.5.2.1.

4.4.1.1 Pennsylvania

The Quarryville Loop lies within the Northern Piedmont Ecoregion (Level III) and the Piedmont Uplands (Level IV) Ecoregion, which are characterized primarily by Appalachian oak forest. Compressor Station 200 lies within the transition zone between the Piedmont Uplands Ecoregion and the Piedmont Limestone Dolomite Lowlands Ecoregion, which is also characterized by Appalachian oak forest; however, virtually all of the forest in the Piedmont Limestone Dolomite Lowlands Ecoregion has been replaced by agriculture, although a few wetlands still occur (Woods et al., 1999).

The major upland cover types crossed by the Project in Pennsylvania include upland forest and open upland and are summarized in table 4.4.1-1.

TABLE 4.4.1-1

Upland Vegetation Cover Types Associated with the Northeast Supply Enhancement Project in Pennsylvania

Vegetation Community	General Description	Common Species
Upland forest	Hardwood Forest	Dominant trees observed in this forest type include northern red oak, chestnut oak, yellow poplar, black birch, black locust, red maple, black walnut, and black cherry.
Open upland	This vegetation community consists of all non-forested, non-wetland habitats including agricultural lands, abandoned agricultural land/shrubland, grasslands, and existing pipeline right-of-way.	Agriculture lands predominantly used for corn and wheat production or pasture/grazing land used by livestock. Existing pipeline rights-of-way mowed on a regular basis to suppress woody plant growth. In residential areas, the existing rights-of-way consist primarily of maintained lawns and a limited amount of scrub-shrub communities.

4.4.1.2 New Jersey

The Madison Loop lies within the Atlantic Coastal Pine Barrens Ecoregion, which is characterized primarily by pine-oak woodlands. Compressor Station 206 lies within the Northern Piedmont Ecoregion. The Raritan Bay Loop lies within the Atlantic Coastal Pine Barrens Ecoregion and the Inner Coastal Plains Subregion. However, the onshore portion of the Raritan Bay Loop is located primarily on developed lands and would be crossed using the HDD method; therefore, the Raritan Bay Loop is not discussed further in this section.

The major upland cover types crossed by the Project in New Jersey include upland forest and open upland and are summarized in tables 4.4.1-2.

TABLE 4.4.1-2

Upland Vegetation Cover Types Associated with the Northeast Supply Enhancement Project in New Jersey

Vegetation Community	General Description	Common Species
Upland forest	Hardwood Forest	Forest type dominated by northern red oak, white oak, red maple, white pine, and black gum.
Open upland	This vegetation community consists of all non-forested, non-wetland habitats including prairie, agricultural lands (which includes pastureland and horse farms), abandoned agricultural land/ shrubland, and existing pipeline right-of-way.	Existing pipeline rights-of-way mowed on a regular basis to suppress woody plant growth. In residential areas, the existing rights-of-way consist primarily of maintained lawns and a limited amount of scrub-shrub communities.

4.4.1.3 Upland Vegetation Affected by the Project

Pennsylvania

Construction of the NESE Project would impact 208.2 acres of upland vegetation in Pennsylvania, of which 201.9 acres (97 percent) consists of open upland vegetation communities, with the remaining 6.3 acres (3 percent) comprised of upland forest (see table 4.4.1-3). Of the 208.2 acres of vegetation affected by construction, 180.4 acres (87 percent) is associated with construction of the Quarryville Loop. Construction at Compressor Station 200 would impact 6.0 acres of open upland vegetation and less than 0.1 acre of upland forest within the fence line of the existing facility, representing less than 3 percent of vegetation affected in Pennsylvania, and the temporary use of contractor yards would impact 21.0 acres of open upland vegetation and 0.2 acre of upland forest, totaling 10 percent of vegetation affected in Pennsylvania. The construction of access roads would account for less than 1 percent of upland vegetation affected by construction in Pennsylvania.

Operation of the NESE Project in Pennsylvania would impact 27.3 acres of upland vegetation, comprised of 25.6 acres of open upland and 1.7 acres of upland forest. The proposed expansion at Compressor Station 200 would permanently impact 3.8 acres of open upland, or 14 percent of the operational impact of the NESE Project on upland vegetation in Pennsylvania.

New Jersey

Construction of the NESE Project would impact 65.8 acres of upland vegetation in New Jersey, of which 37.1 acres (56 percent) consists of open upland vegetation, with the remaining 28.7 acres (44 percent) comprised of upland forest (see table 4.4.1-3). Of the 65.8 acres of vegetation affected by construction, 37.4 acres (57 percent) is associated with construction of the Madison Loop, and 1.6 acres (2 percent) is associated with construction of the onshore portion of the Raritan Bay Loop. Construction at Compressor Station 206, including the permanent access road and inlet and outlet pipeline facilities, would impact 6.6 acres of open upland vegetation and 16.6 acres of upland forest, representing 35 percent of vegetation affected in New Jersey, and the temporary use of contractor yards would impact 0.6 acre of open upland vegetation and 1.4 acres of upland forest, totaling 3 percent of vegetation affected in New Jersey. The construction of additional access roads would account for about 3 percent of upland vegetation affected by construction in New Jersey.

TABLE 4.4.1-3						
Upland Vegetation Affected by the Northeast Supply Enhancement Project (acres)						
	Open Upland		Upland Forest		Total	
State/Facility	Con	Op	Con	Op	Con	Op
PENNSYLVANIA						
Quarryville Loop						
Pipeline [a, b]	174.3	21.7	6.1	1.6	180.4	23.3
Access Roads	0.6	0.1	<0.1	<0.1	0.7	0.2
Contractor Yards [c]	21.0	0.0	0.2	0.0	21.2	0.0
Compressor Station 200	6.0	3.8	<0.1	0.0	6.1	3.8
Pennsylvania Subtotal	201.9	25.6	6.3	1.7	208.2	27.3
NEW JERSEY						
Madison Loop						
Pipeline [a, b]	24.9	2.3	8.9	1.0	33.8	3.3
HDD Tracking Wires [d]	1.8	0.0	1.8	0.0	3.6	0.0
Access Roads	1.4	<0.1	<0.1	0.0	1.5	<0.1
Contractor Yards [c]	0.6	0.0	1.4	0.0	2.0	0.0
Compressor Station 206	5.4	4.9	13.4	10.3	18.8	15.2
Access Road	1.2	1.2	3.2	3.2	4.4	4.4
Raritan Bay Loop (Onshore)						
Pipeline [a, b]	1.4	0.0	0.0	0.0	1.4	0.0
HDD Tracking Wires [d]	0.2	0.0	0.0	0.0	0.2	0.0
Access Roads	0.4	0.0	0.0	0.0	0.4	0.0
New Jersey Subtotal	37.1	8.5	28.7	14.5	65.8	23.0
Project Total	239.0	34.1	35.0	16.1	274.0	50.2

[a] Includes the pipeline right-of-way, and additional temporary workspace. Installation of new mainline valves and modification of existing mainline valves would occur within the temporary construction workspace for the pipeline loops; therefore, no additional temporary impacts on land uses are provided for construction of the valves.

[b] Operation acres impacted include impacts associated with the portion of the new permanent right-of-way located outside of the existing and currently maintained pipeline right-of-way, and the footprint of mainline valves. Following the completion of construction, operation of the valves would result in the permanent conversion of existing land uses to commercial/industrial land use category; operational impacts presented reflect this conversion.

[c] Areas used for contractor yards would be used during construction and would then be allowed to return to pre-construction condition; no operational impacts are anticipated.

[d] To facilitate the HDD, an electric guidewire coil would be placed along the ground surface between each HDD entry and exit point. HDD tracking wires would be installed using foot traffic only and would require minimal removal of vegetation by hand clearing.

Note: The totals shown in this table may not equal the sum of addends due to rounding.

Con = construction; Op = operation

Operation of the NESE Project in New Jersey would impact 23.0 acres of upland vegetation, comprised of 8.5 acres of open upland and 14.5 acres of upland forest. Compressor Station 206 and the associated access road and inlet and outlet pipelines would permanently impact 6.1 acres of open upland and 13.5 acres of upland forest, totaling 85 percent of the operational impact of the NESE Project on upland vegetation in New Jersey.

4.4.2 Vegetation Communities of Special Concern or Management

Transco consulted with federal and state resource agencies to identify sensitive or protected vegetation types, natural areas, and unique plant communities in the onshore Project area. Submerged aquatic vegetation is discussed in section 4.5.2.1. No federally owned or protected natural communities such as designated wilderness areas, wildlife preserves, or national wildlife refuges would be crossed by or located in the vicinity of the NESE Project, and no state sensitive or protected vegetation types, natural areas, and unique plant communities would be crossed by or located in the vicinity of the Project facilities in New Jersey.

The Quarryville Loop would cross two Natural Heritage Areas (NHA) designated under the Pennsylvania Natural Heritage Program (PNHP): the Fishing Creek at Scalpy Hollow Road NHA between MPs 1683.3 and 1683.6, and the Midway Station, Wissler Run NHA between MPs 1681.0 and 1681.2.

The Fishing Creek at Scalpy Hollow Road NHA is in Drumore Township and entails numerous springs and seeps that flow off the adjacent slopes into Fishing Creek as it winds its way through a forested ravine (PNHP, 2008). This NHA contains Species of Concern Core Habitat for the glade spurge, a state-endangered plant species. Suitable habitat for the glade spurge includes seepages, swamps, bottomlands, and streambanks. The Quarryville Loop would not cross suitable habitat for this species within the Fishing Creek at Scalpy Hollow Road NHA, and the PADCNR did not identify this species as having the potential to occur in the Project area. Therefore, impacts on this species are not anticipated.

The Midway Station, Wissler Run NHA is also in Drumore Township and includes two large interior forest patches dominated by dry oak-heath forest with smaller patches of other natural community types. This NHA contains Species of Concern Core Habitat for Bradley's spleenwort (state-threatened), lobed spleenwort (state-special concern), American holly (state-threatened), and cranefly orchid (state-special concern) (PNHP, 2008). Bradley's spleenwort requires rock outcrops along river facing slopes, while the lobed spleenwort grows on dry shaded cliffs and rock outcrops. The cranefly orchid grows in moist, rich forests. At the request of the PADCNR, Transco conducted surveys for the American holly along the Quarryville Loop in August 2016. Two individuals of the state-listed threatened American holly were documented within the construction right-of-way for the Project near MP 1681.1 and are further discussed in section 4.6.4.1.

Compressor Station 200 is not located within the Schuykill River-Port Providence NHA core habitat, but is within the supporting natural landscape. The Schuykill River-Port Providence NHA has been delineated around a stretch of the river from Phoenixville downstream through Valley Forge National Historic Park. This area has been highly developed, with a narrow strip of riparian forest remaining along the floodplain. Channels and man-made wetlands are found in some areas in this NHA (PNHP, 2015). Construction activities associated with Compressor Station 200 would be limited to areas within the existing station fence line; therefore, impacts on the supporting natural landscape of the Schuykill River-Port Providence NHA are not anticipated. In comments on the draft EIS, Chester County also concluded that Project impacts on the Schuykill River-Port Providence NHA would be minimal, if any.

4.4.3 Noxious Weeds and Other Invasive Plants

Invasive species are those that display rapid growth and spread, becoming established over large areas (USDA, 2016). Most commonly they are exotic species that have been introduced from another part of the United States, another region, or another continent, although some native species that exhibit rapid growth and spread are also considered invasive. Invasive plant species can change or degrade natural vegetation communities, which can reduce the quality of habitat for wildlife and native plant species. Similar to invasive species, noxious weeds are frequently introduced but are occasionally native. Noxious weeds are defined as those that are injurious to commercial crops, livestock, or natural habitats and typically grow aggressively in the absence of natural controls (USDA, 2017a). The USDA maintains a List of Federal Noxious Weeds (USDA, 2017b) and most states, including Pennsylvania and New Jersey, have noxious weed control laws and/or maintain lists of noxious and invasive species.

Transco documented noxious and invasive weeds with greater than 25 percent coverage on accessible tracts during its 2016 field surveys. Transco documented six noxious and seven invasive plant species along the Quarryville Loop; four noxious plant species within the non-developed portion of Compressor Station 200; three invasive species within the boundaries of Compressor Station 206; nine invasive plant species along the Madison Loop; and two invasive plant species along the onshore portion of the Raritan Bay Loop. Table 4.4.3-1 summarizes the noxious and invasive species with greater than 25 percent coverage identified in the Project area.

4.4.4 General Impacts and Mitigation

Impacts on vegetation resources are classified based on the duration and significance of impacts. Temporary impacts generally occur during construction with vegetation returning to preconstruction conditions almost immediately after construction, whereas short-term impacts are those that require up to 3 years to return to preconstruction conditions. Long-term impacts require more than 3 years to revegetate, but conditions would return to their preconstruction state during the life of the Project. Permanent impacts are those that modify vegetation resources to the extent that they would not return to preconstruction conditions during the life of the Project.

TABLE 4.4.3-1

Noxious and Invasive Plant Species Occurring within the Northeast Supply Enhancement Project Area

Project Component	Noxious Species [a]	Invasive Species [b]
Quarryville Loop	Musk thistle, Canada thistle, multiflora rose, bull thistle, purple loosestrife, mile-a-minute weed	Asian honeysuckle, Japanese honeysuckle, poison hemlock, garlic mustard, reed canary grass, common reed, autumn olive
Compressor Station 200	Multiflora rose, purple loosestrife, Canada thistle, Johnson grass	None
Compressor Station 206	None	Multiflora rose, common reed, Japanese honeysuckle
Madison Loop	None	Japanese honeysuckle, tree of heaven, Japanese stiltgrass, black locust, oriental bittersweet, multiflora rose, common reed, Japanese knotweed, mugwort
Raritan Bay Loop (onshore only)	None	Mugwort, Japanese honeysuckle

[a] In accordance with the Plant Protection Act of 2000 (7 USC 7701 et seq.), the U.S. government has designated certain plants as noxious weeds. In addition, Pennsylvania maintains a list of legally designated noxious weed species as part of Chapter 110 under the Noxious Weed Law.

[b] PADCNR maintains a list of invasive plant species to guide management efforts; however, this list is not subject to state regulation. The New Jersey Invasive Species Council, formed pursuant to New Jersey Executive Order #97 and charged with completing a comprehensive invasive species management plan for the State of New Jersey, developed the list of non-indigenous plant species in New Jersey.

4.4.4.1 Pipeline and Ancillary Facilities

The degree of impact on upland vegetation from construction and operation of the Quarryville, Madison, and onshore Raritan Bay Loops and associated ancillary facilities would depend on the type of vegetation affected, the rate at which the vegetation would regenerate after construction, and the area and frequency of vegetation maintenance conducted during operation.

The primary effect of pipeline construction would be cutting, clearing, and/or removing 219.0 acres of existing vegetation. During clearing activities, Transco would mow non-woody vegetation to ground level and cut and remove woody vegetation and stumps, as necessary. Transco would fell trees and other woody material into the right-of-way, which would then be used for lumber or would be chipped and removed. At the request of individual landowners, Transco would stack the cut timber on the edge of the right-of-way for landowner use. Construction activities could also cause soil compaction and soil erosion, and introduce or further spread noxious or invasive plant species, all of which could adversely affect revegetation of construction workspaces. The impact of Project construction and operation on wildlife species that utilize the various vegetative communities affected by the Project are discussed in section 4.5.1.

The greatest impact would be in forested areas, which comprise about 8 percent of the upland vegetation affected by pipeline construction. Construction in forested lands would remove the tree canopy over the entire width of the construction right-of-way, which would change the structure and environment of the underlying and adjacent areas. Trees on the edge of the right-of-way might be subject to mechanical damage to trunks and branches and root impacts from soil disturbance and compaction, all of which could result in the decreased health and viability of some trees and root systems. Some edge trees that were previously within dense forested stands may also lack stability following removal of adjacent supporting trees, which could result in increased susceptibility to wind damage. During operation, 2.7 acres of previously forested lands within the maintained right-of-way would be permanently converted to an herbaceous cover type. Because only 2.7 acres of forest would be converted over the entire 13.5 miles of looping, and considering that the pipelines would expand Transco's existing, maintained right-of-way, the amount of forest edge habitat would not substantially increase. However, forested areas adjacent to the expanded right-of-way would have reduced habitat value compared to preconstruction conditions. For similar reasons, the proposed looping would not contribute significantly to forest fragmentation effects on wildlife resources (see section 4.5.1.1). The regrowth of shrubs and trees within temporary workspaces may take decades to resemble the forest vegetation that was present before construction and is considered a long-term impact.

During our pre-filing process, an agricultural landowner on the Quarryville Loop requested that Transco modify the proposed workspace to reduce impacts on a forested area near MP 1682. At this location, about 1.8 acres of forest would be impacted during construction, of which about 0.7 acre would be permanently affected by expansion of Transco's existing right-of-way. Transco modified its original workspace design to reduce construction impacts on forest by about 16 percent at this location.

Construction of the proposed loops would have less impact on agricultural and open lands, which comprise 92 percent of upland vegetation types affected by pipeline construction. Impacts on cultivated land would include the loss of crop production, likely for an entire growing season. Construction could also impact long-term productivity of agricultural lands by causing soil compaction and increased soil erosion, and could introduce or spread invasive plant species. During operation, agricultural production could continue over the areas affected by the proposed loops except where ancillary facilities would be modified or constructed. Open lands currently dominated by herbaceous growth would revegetate quickly, often within one growing season after seeding and otherwise typically within 3 years, depending on a number of factors. Cleared scrub-shrub vegetation communities would likely require 3 to 5 years to regain their woody composition.

In general, impacts on vegetation resources would be minimized by collocating the Quarryville and Madison Loops with Transco's existing right-of-way for nearly their entire length, reducing the area affected by construction and resulting in a nominal expansion of the existing, maintained right-of-way. Transco would further minimize impacts on upland vegetation by implementing the measures outlined in its Plan, including topsoil segregation and replacement, mitigation of compacted soils, and the use of erosion controls. After construction, Transco would seed the affected areas using seed mixes recommended by the NRCS, local agencies or organizations, or relevant landowner agreements. During operation and excluding agricultural land, Transco would mow up to a 50-foot-wide permanent right-of-way no more than once every 3 years to clearly delineate the right-of-way for pipeline integrity purposes; however, a 10-foot-wide swath centered over the pipeline loops may be mowed more frequently to facilitate routine patrols and emergency access. In accordance with Transco's Plan, maintenance clearing would not be conducted between April 1 and August 31, to avoid impacts on nesting migratory birds (see section 4.5.1.2).

Impacts in agricultural areas would be further minimized by implementing measures described in Transco's Agricultural Construction and Monitoring Plan, which specifies, among other practices, topsoil segregation and replacement, rock removal, deep tilling to mitigate soil compaction, and drain tile identification and repair (see table 2.3-3). Transco would also offer to compensate landowners for lost crop production, and would monitor the right-of-way for three seasons or until successful restoration is achieved. By implementing these measures, most impacts on agricultural lands would be temporary to short-term because these areas are disturbed annually to produce crops and would typically return to their previous condition and use shortly following construction, cleanup, and restoration.

To minimize the spread of invasive species, Transco would implement its Noxious Weed and Invasive Plant Management Plan that was developed in consultation with applicable state regulatory agencies (see table 2.3-3). The plan outlines methods to prevent, mitigate, and control the spread of noxious and invasive weeds during ground-disturbing activities. In general, vehicles and equipment would be inspected and cleaned of soils, vegetation, and debris before they are brought to the Project area or moved to another work area within the construction right-of-way. Cleaning procedures would occur in areas where the percent cover of noxious and/or invasive species is greater than 25 percent as identified in the Noxious Weed and Invasive Plant Management Plan and where the adjacent right-of-way is relatively free of noxious/invasive plant species. Following construction, Transco would monitor the right-of-way for invasive species. If populations of noxious or invasive plant species are identified (in exceedance of adjacent, undisturbed locations) during the post-construction monitoring, Transco would consult with a state-certified applicator and applicable regulating agency to determine the most effective method of control (e.g., herbicide, mechanical). Any herbicides that are used would be applied in accordance with agency regulations and manufacturer's recommendations, and no herbicides would be applied within 100 feet of a wetland or waterbody except as allowed by the appropriate state or federal agency. We reviewed Transco's Noxious Weed and Invasive Plant Management Plan and found it acceptable.

In summary, construction and operation of the proposed loops would result in temporary, short-term, long-term, and permanent impacts on open land (including agricultural land) and upland forest vegetation resources. However, we conclude that collocation of the pipeline facilities with Transco's existing maintained right-of-way and implementation of the measures outlined in Transco's Plan, Agricultural Construction and Monitoring Plan, and Noxious Weed and Invasive Plant Management Plan, would adequately minimize impacts on upland vegetation resources.

4.4.4.2 Aboveground Facilities

Impacts on vegetation at existing Compressor Station 200 and new Compressor Station 206 would be similar to those described for the pipeline facilities, and would include the removal of existing vegetation, the potential for soil compaction and erosion, and the potential to introduce or spread invasive plant species. In general, impacts on open land vegetative communities in temporary workspaces would be temporary or short-term, whereas impacts on upland forest in temporary workspaces would be long-term. Within the operational footprint of aboveground facilities, vegetation would be removed and replaced by buildings, other infrastructure, pavement, gravel, or mowed lawn, permanently impacting vegetation resources in these areas. Transco would implement similar measures to minimize impacts on vegetation resources at aboveground facilities as would be implemented for the proposed pipeline loops (see section 4.4.4.1).

As indicated in table 4.4.1-3, construction of Compressor Station 206, including the access road and inlet and outlet pipeline facilities, would impact 16.6 acres of upland forest, 13.5 acres of which would be permanently converted to open or industrial land for facility operation. We received comments expressing concern that Compressor Station 206 could result in forest fragmentation effects on wildlife. The potential impacts of Project construction on wildlife, including by forest fragmentation, is discussed in section 4.5.1.1.

4.4.4.3 Contractor Yards

The contractor yards associated with the Quarryville Loop generally consist of agricultural land and the contractor yards associated with the Madison Loop are generally wooded land, open undeveloped parcels, or previously developed land. The two contractor yards associated with the Raritan Bay Loop are existing, fully developed marine support facilities within commercial and industrial areas. Use of the contractor yards would temporarily impact 21.6 acres of open and agricultural vegetative communities and 1.6 acres of upland forest.

Impacts on vegetation at contractor yards would be similar to those described for the pipeline facilities, and would include the removal of existing vegetation, the potential for soil compaction and erosion, and the potential to introduce or spread invasive plant species. Transco would not utilize or maintain the contractor yards after completion of construction. Therefore, most vegetation impacts would be temporary or short-term, although the removal of 1.6 acres of upland forest would be a long-term impact as the previously forested area would take decades to return to pre-construction conditions. Transco would implement similar measures to minimize impacts on vegetation resources at contractor yards as would be implemented for the proposed pipeline loops (see section 4.4.4.1).

4.4.4.4 Access Roads

Impacts on vegetation associated with the construction of access roads would be comparable to those described for the proposed pipeline loops, including the removal of vegetation, potential for soil compaction and erosion, the establishment of invasive species, and fragmentation of interior forested tracts. Impacts on open land vegetative communities in temporary workspaces would generally be temporary or short term, whereas impacts on upland forest in temporary workspaces would be long-term. Vegetation would be permanently impacted within the operating rights-of-way of new or modified access roads. As detailed in table 4.7.1-8, impacts associated with access roads would be minimized by utilizing existing roads to the extent possible and by minimizing the length of new access roads. As a result, the construction of 26 new or modified access roads would impact 7.0 acres, and operation of permanent access roads would affect 4.7 acres, which includes the access road to Compressor Station 206. Transco would implement similar measures to minimize impacts on vegetative resources from access roads as would be implemented for the proposed pipeline loops (see section 4.4.4.1).

4.5 WILDLIFE AND AQUATIC RESOURCES

4.5.1 Onshore Resources and Habitats

This section identifies and describes the various wildlife and fish species associated with the terrestrial and aquatic community types traversed by the onshore portion of the Project. It also identifies sensitive wildlife and aquatic habitats, such as those managed by federal and state agencies.

4.5.1.1 Terrestrial Wildlife

The Project would traverse habitats that support a variety of wildlife species. Vegetation cover type and density are important environmental factors influencing wildlife habitat and species distribution. Variations in vegetation community types (e.g., deciduous hardwood and conifer are community types within the forested upland vegetation cover type) and other conditions, such as topography and existing land use, influence the quality and availability of wildlife habitat within the Project area.

Representative wildlife species that could be found in major habitat types within the Project area are described in table 4.5.1-1. In general, the greatest wildlife diversity and density is in natural habitats such as extensive, contiguous forest tracts, successional habitats (scrub-shrub), and grasslands, whereas habitats in agricultural lands such as pastures, croplands, and hayfields harbor generalist wildlife species, consisting primarily of small mammals and white-tailed deer (Hibbitts et al., 2013). Freshwater aquatic resources and habitat are discussed in section 4.5.1.3. The various vegetation communities crossed by the Project and that serve as wildlife habitat are described by state in section 4.4.1.

Upland Forest

The upland forests in the Project area provide moderate to high quality habitat for a variety of mammals, birds, amphibians, reptiles, and invertebrates (see table 4.5.1-1). The predominance of oak is an important habitat component in upland forests in the Project area. Some mammals rely directly on oak mast as a food source, while amphibians and invertebrates rely on the soil chemistry of an oak forest. Predatory species, such as raptors, red fox, and timber rattlesnake, are also attracted to oak-dominated forests and their edges due to the abundance and diversity of prey species. The tree and shrub layers provide food and cover for birds and larger mammals, such as white-tailed deer. Detritus on the forest floor provides food and cover for invertebrates, amphibians, reptiles, and smaller mammals, such as woodchuck and eastern chipmunk.

Open Upland

This cover type category covers all non-forested vegetation, including grasslands, pasture, agricultural land, shrublands, and maintained utility rights-of-way. Grasslands and old fields can be used as foraging and denning habitat by mammals, and provide nesting, breeding, and foraging habitat to upland game birds such as pheasants. Open fields and shrub cover provide habitat for small mammal species such as mice, rabbits, and voles, which make them prime hunting grounds for predator species such as foxes, coyotes, and raptors. Pastures provide grazing habitat for species such as white-tailed deer. Hayfields, small grains, fallow and old fields, pastures, and idled croplands provide nesting habitats for grassland-nesting birds (USDA, 1999). On landscapes where intensive row crop agriculture is the dominant land use, these strip habitats are extremely important for grassland birds and other wildlife despite providing poor to moderate cover habitat. Shrublands provide sources of food and nesting sites for various birds, as well as cover for invertebrates, reptiles, and amphibians. Rights-of-way for utility lines maintained in early successional communities provide valuable nesting and foraging habitats for grassland bird species (USDA, 1999).

TABLE 4.5.1-1

Common Wildlife Species Occurring in Major Habitat Types Traversed by the Northeast Supply Enhancement Project [a]

Common Name	Uplands			Wetlands			Open Water
	Upland Forest	Open Upland	Developed	Palustrine Forested	Palustrine Emergent	Palustrine Scrub-shrub	
MAMMALS							
Black bear	X	--	--	--	--	X	--
Gray fox	X	--	--	--	--	X	--
Raccoon	X	--	--	--	--	--	--
Gray squirrel	X	--	--	--	--	--	--
Eastern chipmunk	X	--	--	--	--	--	--
Southern flying squirrel	X	--	--	--	--	--	--
Porcupine	X	--	--	--	--	--	--
Opossum	X	--	--	--	--	--	--
Bat	X	--	--	--	--	--	--
White-tailed deer	X	X	--	--	--	X	--
Woodchuck	--	X	--	--	--	--	--
Eastern cottontail	--	X	--	--	--	X	--
Meadow jumping mouse	--	X	--	--	--	--	--
Meadow vole	--	X	--	--	--	--	--
White-footed mouse	--	X	--	--	--	X	--
Coyotes	--	X		--	--	--	--
Red fox	--	X	--	--	--	X	--
Beaver	--	--	--	X	X	X	X
Muskrat	--	--	--	X	X	X	X
Mink	--	--	--	X	X	X	X
Striped skunk	X	X	--	--	--	--	--
Brown rat	--	--	X	--	--	--	--
BIRDS							
Killdeer	X	--	--	--	X	--	--
House sparrow	--	--	X	--	--	--	--
American crow	X	X	X	--	--	--	--
Wild turkey	X	X	--	--	--	--	--
Ring-necked pheasant	X	--	--	--	X	X	--
Eastern wood-pewee	X	--	--	--	--	--	--
Ovenbird	X	--	--	--	--	--	--
Song sparrow	X	--	--	--	--	--	--
Gray catbird	X	--	--	--	--	--	--
Common yellowthroat	--	--	--	X	X	--	--
Barn swallow	--	X	--	--	--	--	--
Red-winged blackbird	--	--	--	X	X	--	--
Brown-headed cowbird	X	--	--	--	--	--	--
Wood thrush	X	--	--	--	--	--	--
Prairie warbler [b]	X	X	--	--	--	--	--
Wild turkey	X	X	--	--	--	--	--
Barred owl	X	--	--	--	--	--	--
Great-horned owl	X	--	--	--	--	--	--
Eastern screech owl	X	--	--	--	--	--	--
European starling	--	X	X	--	--	--	--
Rock dove	--	X	X	--	--	--	--

TABLE 4.5.1-1 (cont'd)

Common Wildlife Species Occurring in Major Habitat Types Traversed by the Northeast Supply Enhancement Project [a]

Common Name	Uplands: Upland Forest	Uplands: Open Upland	Uplands: Developed	Wetlands: Palustrine Forested	Wetlands: Palustrine Emergent	Wetlands: Palustrine Scrub-shrub	Open Water
AMPHIBIANS							
Green frog	--	--	--	X	X	--	X
Eastern American toad	X	X	X	--	--	--	--
Northern dusky salamander	--	--	--	X	X	--	X
Redback salamander	--	--	--	X	X	--	X
Northern two-lined salamander	X	--	--	X	X	X	X
Eastern red-backed salamander	X	--	--	X	--	--	--
Marbled salamander	--	--	--	--	X	--	X
Gray tree frog	X	X	--	X	--	--	--
Pickerel frog	--	--	--	--	X	--	X
Spring peeper	--	--	--	X	X	--	X
REPTILES							
Northern water snake	--	--	--	X	X	X	X
Snapping turtle	--	--	--	X	X	--	X
Northern ring neck snake	X	--	--	--	--	--	--
Northern black racer	X	X	X	--	--	--	--
Eastern box turtle	X	--	--	--	--	--	--
Common garter snake	X	X	X	X	X	--	X

[a] Modifications at existing Compressor Station 200 and existing MLV sites would occur within the facility fence line or within or adjacent to existing maintained permanent rights-of-way, and are not expected to require tree clearing. Construction and operation of new MLVs would be installed along the pipeline loops at new locations within Transco's construction and permanent rights-of-way, respectively, and would result in a permanent land use conversion to commercial/industrial. Wildlife found at the facilities would be similar to those identified under the open upland and developed habitat type included in this table.

[b] Bird of Conservation Concern (refer to section 4.5.1.2).

Sources: New Jersey Division of Fish and Wildlife Endangered and Nongame Species Program, 2017; Pennsylvania Herp, 2008-2016; National Audubon Society, 2017a.

Developed Areas

Developed lands in the Project area consist of land uses classified as industrial/commercial, residential, and road/railroad crossings. These types of lands tend to provide minimal habitat for wildlife species because the vegetation has been replaced by structures or other features that cover the landscape. Wildlife diversity is often limited to species that are adapted to human presence and the associated anthropogenic changes to the landscape, such as paved and landscaped areas.

Wetlands

Forested wetlands are dominated by woody vegetation and provide a diverse assemblage of vegetation and an abundance of food and water sources for wildlife. The forested wetland canopy is typically dominated by red maple, which is a highly desirable wildlife browse. Mammals such as mink, muskrat, raccoon, and white-tailed deer use these areas as foraging habitat (see table 4.5.1-1). Many waterfowl and wading birds use forested wetlands adjacent to scrub-shrub and emergent wetlands for nesting and foraging. Forested wetland communities are also important habitats for reptiles and amphibians including the American bullfrog, green frog, and various salamander species.

Emergent wetlands provide important habitat for waterfowl, muskrats, herons, frogs, and salamanders (see table 4.5.1-1). Bird species such as red wing blackbird and grey catbird also use emergent wetland habitat.

Scrub-shrub wetlands provide cover for invertebrates, reptiles, and amphibians (see table 4.5.1-1). Scrub-shrub cover provides habitat for small mammal species such as mice and rabbits, which make them prime hunting grounds for predator species.

Open Water

The onshore open water cover type includes the creeks, streams, and rivers crossed by the Project. In addition to the freshwater aquatic resources discussed in sections 4.5.1.3, the open water cover type provides important foraging and breeding habitat for various terrestrial species including waterfowl, reptiles, amphibians, and some mammals (see table 4.5.1-1).

Pollinator Habitat

On June 20, 2014, President Barack Obama signed a Presidential Memorandum titled "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators." According to the memorandum, "there has been a significant loss of pollinators, including honey bees, native bees, birds, bats, and butterflies, from the environment." The memorandum also states that, "given the breadth, severity, and persistence of pollinator losses, it is critical to expand federal efforts and take new steps to reverse pollinator losses and help restore populations to healthy levels." In response to the Presidential Memorandum, the federal Pollinator Health Task Force published a National Strategy to Promote the Health of Honey Bees and Other Pollinators in May 2015. This strategy established a process to increase and improve pollinator habitat.

Pollinator habitat in and adjacent to the Project area can be found in a variety of vegetation types. Common insect pollinators in the Project area include various species of bees, butterflies, and moths. The New Jersey Field Office of the FWS recommended that Transco revegetate disturbed lands with native wildflowers that would support honey bees, monarch butterflies, and other insect pollinators (FWS, 2017b).

Construction of the Project would temporarily impact about 114.9 acres of pollinator habitat. The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators. Transco committed to revegetating areas disturbed by construction using seed mixes that are native to the region and benefit migratory birds and pollinators. Transco continues to coordinate with the FWS, NRCS, state resource management agencies, and soil conservation districts to identify seed mixes and practices to be used during construction to promote pollinator health and potentially provide a net benefit to pollinators in areas where pre-construction vegetation lacks pollinator habitat.

General Impacts and Mitigation

Primary impacts on terrestrial wildlife from the Project could include mortality and displacement, decreasing or alteration of habitat (including forest fragmentation), and effects associated with noise, light, and air emissions.

Pipeline and Ancillary Facilities

Construction of the onshore loops would require clearing of upland and wetland vegetation from the right-of-way, temporarily decreasing the amount of wildlife habitat and reducing protective cover and foraging habitat in the immediate Project area. In general, the degree of construction-related impacts on wildlife would depend on the particular species and the time of year of construction. It is expected that most wildlife, such as birds and larger mammals, would temporarily relocate to adjacent available habitat as construction activities approach. Construction could result in the mortality of less mobile animals such as small rodents, reptiles, amphibians, and invertebrates, which may be unable to escape the immediate construction area, but wildlife mortality is not anticipated to be significant. Depending on the season, construction could also disrupt bird courting or nesting, including destruction of nests, eggs, and chicks within the construction work area. Following construction, Transco would revegetate and restore upland and wetland vegetation in accordance with the measures outlined in its Plan and Procedures, as well as any other requirements from the appropriate local or state agencies (see table 1.5-1). As such, these impacts would be short-term (except along the permanently maintained pipeline right-of-way) as most habitats would be allowed to reestablish in temporary construction workspace areas, thus remaining available for wildlife as habitat and watershed functions following construction.

The impact of forest fragmentation on wildlife in the eastern United States has emerged as an important issue. Fragmentation generally affects birds through dispersal barriers, absence of suitable microhabitats, small population size, and edge effects (Degraaf and Healy, 1990). Migratory birds are among the best-studied groups of wildlife regarding adverse effects from fragmentation. Edge effects can result in interactions between birds that nest in the interior of forests and species that inhabit surrounding landscape, typically lowering the reproductive success of the interior species. Other evidence suggests that certain mammals, amphibians, reptiles, and plants are also adversely affected by forest fragmentation. Species that require large tracts of unbroken forest land may be forced to seek suitable habitat elsewhere. The loss of forest habitat, expansion of existing corridors, and the creation of open early successional and induced edge habitats could decrease the quality of habitat for forest interior wildlife species in a corridor much wider than the actual cleared right-of-way. The distance an edge effect extends into a woodland is variable, but most studies point to at least 300 feet (Rodewald, 2001; Jones et al., 2000; Ontario Ministry of Natural Resources, 2000; Robbins, 1988; Rosenberg et al., 1999). Edge impacts within this distance could include a change in available habitat for some species due to an increase in light and temperature levels on the forest floor and the subsequent reduction in soil moisture, thereby resulting in habitat that would no longer be suitable for species that require these specific habitat conditions, such as salamanders and amphibians. An alteration of habitat could affect the fitness of some species and increase competition both within and between species, possibly resulting in an overall change to the structure of the forest community.

The impact of forest fragmentation associated with the onshore loops is expected to be minor as about 97 percent of the Quarryville Loop and 100 percent of the Madison Loop would be collocated with Transco's existing, cleared and permanently maintained right-of-way. The widening of the existing right-of-way in forested areas would not significantly increase the amount of existing edge habitat, and the relatively small widening (typically 25 feet) of permanently cleared right-of-way would be unlikely to impede the movement of most forest interior species. In addition, only about 2.6 acres of forest would be affected by operation of the loops. As such, the overall impact of permanent forest conversion on wildlife resulting from the operation of the loops would be minor due to the aforementioned collocation and the large expanse of forested land available in the Project area.

Wildlife relies on hearing for courtship and mating, prey location, predator detection, and/or homing. These behaviors and interactions could be affected by noise resulting from construction and operation of the projects. Noise would be generated by heavy equipment and machinery during construction of the Project. Most construction activities would be limited to daytime hours (7:00 a.m. to 7:00 p.m.), with the exception of a limited number of 24-hour activities, such as HDD installations. Construction is anticipated to occur throughout the year. Noise levels along the construction right-of-way would vary depending on the phase of work, equipment in use, distance from noise receptors, and intervening topography. Construction noise could lead to nest abandonment, egg failure, reduced juvenile growth and survival, or malnutrition or starvation of the young. However, studies note that separating the effects of acute increases in noise levels from the optical stimulus that often accompany such noises (e.g., the loud noise of a low-flying aircraft and the observation of the approaching aircraft) can be difficult (Kempf and Huppop, 1997). Thus, during construction, the effects of noise on wildlife would be greatest immediately adjacent to the construction right-of-way.

During the operation of the pipeline, noise would also be generated during monitoring and maintenance activities, such as vegetation clearing on the permanent right-of-way, or during ground or air surveillance of the pipeline, as required by DOT regulations. Surveillance activities could cause startle effects in wildlife in proximity to the pipeline; however, these activities would be infrequent and temporary in duration.

Aboveground Facilities

Modifications to Compressor Station 200 would impact 6.0 acres of open upland vegetation, with 3.8 acres of open upland being permanently converted to developed land. These impacts would occur within the existing fenced facility. Wildlife near Compressor Station 200 are already acclimated to the permanent noise and lighting environment associated with the facility so no significant additional effects on wildlife habitat are expected.

Construction of new Compressor Station 206 and the associated access road would impact 6.6 acres of open upland vegetation and 16.6 acres of upland forest, and would result in the permanent conversion of about 6.1 acres of open upland, 13.5 acres of forested land, and 3.7 acres of wetland to developed land. Similar to the impacts discussed above for the pipeline loops, construction of Compressor Station 206 could result in the mortality of less mobile animals such as small rodents, reptiles, amphibians, and invertebrates unable to escape the immediate construction area. In addition, some wildlife would likely be permanently displaced from the Compressor Station 206 site as a result of habitat conversion to non-vegetated and/or impervious cover (i.e., slab, gravel, aboveground structures) or maintained vegetation (i.e., ornamentals and maintained lawn), and the erection of security fences around the site.

We received comments expressing concern that Compressor Station 206 could result in forest fragmentation effects on wildlife. Construction of Compressor Station 206 and interconnecting pipeline would result in the removal of 13.4 acres of upland forest from a generally rectangular area near the edge of an existing pasture to the west of the site and between three nearby maintained linear rights-of-way that cross the area. An additional 3.2 acres of upland forest would be removed during construction of the access road to the facility. The access road would generally parallel the edge of the pasture, and the interconnecting pipelines would closely parallel one of the existing, maintained rights-of-way. After construction, the existing forested areas to the north, east, and south of the site would remain and continue to provide habitat to local wildlife. Thus, although wildlife in the immediate vicinity of Compressor Station 206 could experience effects associated with fragmentation as described above in conjunction with linear pipeline facilities, we would not expect these impacts to be significant due to the location of the compressor station in an area where wildlife has adapted to existing development on and near the site.

We received comments regarding noise impacts on wildlife near Compressor Station 206. The effects of noise on wildlife during construction of Compressor Station 206 would be similar to that described for pipeline construction. During operation, Compressor Station 206 would generate noise on a continuous basis, which could impact nearby wildlife as discussed below.

Effects on wildlife from chronic noise vary by species (Barber et al., 2009; Francis et al., 2011a, 2011b; Francis et al., 2012; Blickley et al., 2012). The number of individual birds present near oil and gas infrastructure has been shown to decline with proximity to the facility, but reproductive success was higher than expected, seemingly due to a proportionate decline in the presence of nest predators (Francis et al., 2011a). In another instance, increased noise levels from oil and gas infrastructure appeared to reduce reproductive success, potentially due to an inability of the females of the species to adequately hear male courtship songs (Habib et al., 2006). Another study concluded that species may be able to adjust to chronic noise by changing their vocalizations in ways that would allow them to be better heard (Francis et al., 2011b).

Noise levels decrease exponentially with distance from the source, and this decrease is accelerated within forested areas relative to the type of forest and the extent of understory present (Huisman and Attenborough, 1991). Compressor Station 206 is primarily surrounded by forested land. Transco would implement various noise mitigation measures at Compressor Station 206, such as using noise-attenuating structures; turbine exhaust and intake silencers and breakouts; blowdown silencers; underground suction and discharge piping; and acoustically lagged aboveground main gas piping. The noise levels that wildlife would be exposed to beyond the compressor station property boundaries would vary based on the distance from the facility, but would be at or below 55 dBA. A full description of the noise impacts associated with operation of Compressor Station 206 is provided in section 4.10.2.2. Based on Transco's proposed noise mitigation measures and the representative wildlife species near Compressor Station 206, in the years following initial construction, birds and other wildlife would either become habituated to the operational noise associated with the compressor station or move into similar available habitat farther from the noise source. As such, the effects on wildlife due to noise emissions would be minimal and highly localized.

We received comments concerning the potential impact of lighting at Compressor Station 206 on birds, including from the NJDEP. Many migratory birds use natural light from the sun, moon, and stars for navigation. Artificial lighting can hide natural light sources, having unknown effects on birds at the population level. Fatalities to avian species due to artificial light are well documented and are associated with attraction to light sources, especially in low light, fog, and when there is a low cloud ceiling (Patterson, 2012). Although Compressor Station 206 would be separated from residences and other facilities (see table 2.1.2-1), the general area includes residences, commercial and industrial facilities, and roadways, all of which are sources of artificial nighttime light. Thus, some species in the area have acclimated to nighttime light. To minimize potential lighting impacts on birds, Transco would install the minimum amount of Dark Sky-compliant LED lighting necessary for site security and safety of compressor station personnel, and would direct the light downward. With implementation of these mitigation measures, security lighting at Compressor Station 206 would not significantly impact birds or other sensitive wildlife.

We received numerous comments expressing concern that Compressor Station 206 would impact trees and birds due to the velocity and temperature of air emissions from the natural gas-fired turbine compressor exhaust stacks. The two 50-foot-high exhaust stacks would be located next to each other within the developed area of the compressor station facility, about 250 feet from the post-construction tree line. While there is no available data on high velocity, high temperature exhaust impacts on birds, we do acknowledge that it is possible for birds to enter into the exhaust stream. Due to the industrial nature of the compressor station (increased noise, human activity, and light during nighttime hours) and distance between the exhaust stack and nearest tree line, we conclude that the potential for exhaust from the compressor station to significantly impact birds is low. Impacts and conservation measures associated with raptors and other migratory birds are discussed in more detail in section 4.5.1.2.

Contractor Yards and Access Roads

Areas used for contractor yards and temporary access roads would be affected during construction only; no operational impacts would occur. As such, impacts on wildlife species at or near contractor yards and temporary access roads would be similar to that described above for pipeline construction.

Six access roads would be retained in their modified condition for future access during operation of the pipelines, which would permanently convert about 0.2 acre of open upland vegetation and less than 0.1 acre of upland forest to developed lands. As a result, some wildlife could be permanently displaced in these areas as a result of habitat conversion to non-vegetated and/or impervious cover.

4.5.1.2 Raptors and Other Migratory Birds

Migratory birds are federally protected under the MBTA. The MBTA (16 USC 703-712) as amended, implements protection of many migratory game and non-game birds with exceptions for the control of species that cause damage to agricultural or other interests. The MBTA prohibits the take of any migratory bird or their parts, nests, and eggs, where "take" means to "pursue, hunt, shoot, wound, kill, trap, capture, or collect."

Executive Order 13186 (66 Federal Register 3853) requires that all federal agencies undertaking activities that may negatively affect migratory birds take a prescribed set of actions to further implement the MBTA, and directs federal agencies to develop a memorandum of understanding (MOU) with the FWS that promotes the conservation of migratory birds through enhanced collaboration with the FWS. FERC entered into an MOU with the FWS in March 2011.

Though all migratory birds are afforded protection under the MBTA, both Executive Order 13186 and the MOU require that Birds of Conservation Concern (BCC) and federally listed species be given priority when considering the effects on migratory birds. Executive Order 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts.

Bald and Golden Eagles

Beyond the MBTA, the BGEPA (16 USC 668-668d) provides additional protection to bald and golden eagles. The BGEPA prohibits the take, possession, sale, offer to sell, purchase, barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. "Take" under this act is defined as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." Disturb is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." If a proposed project or action occurs in an area where nesting, feeding, or roosting eagles occur, the proponent often needs to implement special conservation measures to comply with the BGEPA.

The Pennsylvania Office of the FWS identified a known bald eagle nest approximately 0.3 mile from the Quarryville Loop and indicated that the current eagle population in the area is expanding, with the possibility of additional, new nests closer to the Project area. In addition, the New Jersey Field Office of the FWS identified a known eagle's nest approximately 1 mile from the Madison Loop.

Bird Conservation Regions and Birds of Conservation Concern

Bird Conservation Regions are regions in North America that are ecologically distinct and that have similar migratory bird communities, habitats, and natural resource issues (North American Bird Conservation Initiative, 2013). The 1988 amendment to the Fish and Wildlife Conservation Act mandates that the FWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973." As a result of this mandate, the FWS created the BCC list. The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions and coordinating consultations in accordance with Executive Order 13186.

Based on Executive Order 13186, federal agencies are encouraged to focus conservation measures on BCC. Transco's Final Migratory Bird Plan (see table 2.3-3) lists the species included on the BCC list for the BCRs (BCRs 29 and 30) crossed by the Project. Sections 4.6.3 and 4.6.4 include a discussion of federally and state-listed bird species identified in the Project area, respectively.

Important Bird Areas

IBAs are sites that provide essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may cover a few acres or thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. IBAs may include public or private lands, or both, and they may be protected or unprotected (National Audubon Society, 2017b). The FERC and FWS MOU requires that agencies and Applicants identify measures to protect, restore, and manage, as practicable, IBAs, and other significant bird sites that occur on lands impacted by projects.

The Quarryville Loop crosses the Lower Susquehanna River Gorge-Conowingo/Muddy Run IBA between MPs 1681.0 and 1681.6. In 1967, the Lower Susquehanna River Gorge-Conowingo/Muddy Run IBA site was flooded to create a 985-acre-storage reservoir, owned and operated by the Philadelphia Electric Company. The IBA also includes a 100-acre recreational lake, 500-acre park, and an additional 1,900 acres of old fields, woodlands, cultivated fields, and plantings by the PAGC and NRCS, all created as mitigation for a hydroelectric project (Nation Audubon Society, 2017c). A 1-mile stretch of continuous woodlands borders the river adjacent to the site. This area provides breeding habitat for orchard orioles, northern orioles, cedar waxwings, and blue grosbeaks. The wooded areas of Muddy Run within the IBA offer habitat to 23 species of warblers. Other birds observed using this IBA include the American black duck, bald eagle, osprey, tundra swan, and snow geese.

The Raritan Bay Loop would be within the Raritan Bay and Southern Shore IBA between MPs 12.3 and 14.0 and MPs 26.5 and 27.6. The Raritan Bay and Southern Shore IBA is a 34,869-acre area that includes the open water of Raritan/Sandy Hook Bay from the confluence of the Shrewsbury and Navesink Rivers and Sandy Hook, west to Raritan River, and includes the southern shore and a strip of bayshore forests, dunes, marsh, and beach. This shoreline also consists of 3,600 acres of shallow tidal mudflats and sandflats and the largest remaining salt marsh on the Raritan Bay, Conaskonk Point. Many state-listed species use the bay for foraging during breeding season. These include state-endangered black skimmers and least terns and state-threatened yellow-crowned night-herons, black-crowned night-herons, and ospreys. The salt marsh of Conaskonk Point hosts breeding American black duck, clapper rail, mallard, marsh wren, osprey, willet, green heron, American oystercatcher, and seaside and saltmarsh sharp-tailed sparrow. Conaskonk Point is also important for sanderlings, ruddy turnstones, semipalmated sandpipers, and red knots that benefit from a supply of protein-rich horseshoe crab eggs during spring migration. Wintering waterfowl species include brant, bufflehead, northern pintail, American black duck, white-winged scoter, black scoter, common goldeneye, long-tailed duck, red-breasted merganser, and red-throated loons, and as many as 30,000 greater scaup (New Jersey Audubon, 2014).

We also received comments regarding potential impacts on birds that use two nearby IBAs due to the construction of Compressor Station 206: the Delaware and Raritan Canal State Park IBA and the Sourland Mountain Region IBA.

The boundary of the Delaware and Raritan Canal State Park IBA is about 3,500 feet from the proposed Compressor Station 206 compressor building. The Delaware and Raritan Canal State Park IBA is a 70-mile-long linear park with associated natural areas that follows the Delaware and Raritan Canal.

This IBA consists of 12,907 acres of freshwater floodplain and riverine habitats (New Jersey Audubon, 2017a). State-endangered bald eagles breed and winter at this site. Open fields in various stages of succession along the canal support state-threatened American kestrels, American woodcocks, northern bobwhites, eastern towhees, and field sparrows. Additional birds breeding within Delaware and Raritan Canal State Park IBA include Cooper's hawks, veery, and a cliff swallow colony at Bull's Island. Spring and fall migrants rely heavily upon the stopover habitats provided by the park. This IBA also supports an exceptional diversity of bird species throughout the year. Surveys conducted throughout the IBA revealed 160 species of birds, 90 of which nested in the park (New Jersey Audubon, 2017a).

The Sourland Mountain Region IBA is about 4.2 miles from Compressor Station 206 and consists of 57,873 acres of deciduous forest with freshwater wetlands and agricultural lands. This IBA contains approximately 25,000 acres of mature, contiguous forest, 7,500 acres of wetlands, and 20,000 acres of agricultural land in active production. The Sourland Mountain Region IBA is a macrosite, which includes Featherbed Lane IBA and Baldpate Mountain IBA (New Jersey Audubon, 2017b). The Sourland Mountain Region IBA includes extensive forested habitats that support woodland breeding birds including Kentucky warblers, sharp-shinned hawks, red-headed woodpeckers, brown thrashers, hooded warblers, worm-eating warblers, Canada warblers, grasshopper sparrows, bobolinks, eastern meadowlarks, wood thrushes, yellow-billed cuckoos, black-billed cuckoos, American kestrels, red-shouldered hawks, broad-winged hawks, Cooper's hawks, and barred owls. Scrub-shrub habitats support field sparrow, eastern towhee, wild turkey, and American woodcock (New Jersey Audubon, 2017b; Washington, 2017). The IBA is especially known for nesting birds occurring on the edges of their breeding ranges including summer tanagers, winter wrens, and black-capped and Carolina chickadees. Long-term avian studies conducted at Featherbed Lane confirm an impressive diversity of over 70 breeding birds. In addition, the IBA serves as an important stopover area for migratory birds (New Jersey Audubon, 2017b).

We received comments on the draft EIS regarding potential impacts on birds that use the Jamaica Bay Wildlife Refuge, which consists of about 2,000 acres of salt marsh habitat, beaches, and upland shrub and grassland in central Jamaica Bay, approximately 6.3 miles north from the termination of the Raritan Bay Loop. Although not noted by the commenter, the Jamaica Bay Wildlife Refuge occurs within the greater Jamaica Bay IBA, which includes all of Jamaica Bay and the seaward beaches of Rockaway Peninsula, which are as near as 3 miles from the termination of the Raritan Bay Loop. About 12,000 of the original 16,000 acres of wetlands in Jamaica Bay have been filled, and other areas have been dredged for navigation channels and to provide fill for airports and other construction projects. The habitat present in the Jamaica Bay IBA supports a renowned abundance and diversity of shorebirds, waterfowl, gulls, terns, and other species. During migration, the site hosts black-bellied plovers, red knots, and more than 35 other shorebird species. The beaches are breeding sites for piping plovers, laughing gulls, roseate terns, common terns, Forster's terns, least terns, and black skimmers. The area is an important waterfowl wintering area as well, with healthy numbers of Brant and scaup. Significant numbers of hawks are also observed each year, including peregrine falcons (Audubon, 2018).

General Impacts and Mitigation

The potential impacts on raptors and migratory birds, including BCC-listed birds and species occupying IBAs, would be similar to those discussed for wildlife in section 4.5.1.1, and would include the temporary and permanent loss of habitat associated with the removal of existing vegetation. The greatest potential to impact raptors and migratory birds would occur if Project construction activities such as grading, tree clearing, and construction noise take place during the nesting season. This could result in the destruction of nests and mortality of eggs and young birds that have not yet fledged. Construction would also reduce the amount of habitat available for resources such as foraging and predator protection for migratory birds, and would temporarily displace birds into adjacent habitats. The loss of about 35.0 acres of upland forest and 3.0 acres of forested wetland associated with construction of the Project (see tables

4.3.4-1 and 4.4.1-3) would present a long-term impact for migratory birds that depend on forest. This impact could increase the competition for food and other resources, which in turn could increase stress and susceptibility to predation, and negatively impact reproductive success. Collocation of the pipeline with Transco's existing pipeline system would minimize the impacts of permanent habitat loss. In addition, measures included in Transco's Plan and Procedures require that maintenance of the permanent right-of-way during operations occur outside of the state-specific migratory bird time of year restrictions. Noise and other construction activities could affect courtship and breeding activities including nesting and the rearing of young. Migratory birds not already nesting would be able to avoid these activities and move to other available habitat in the Project area. Therefore, we conclude that impacts on migratory birds from construction of the Project would largely be temporary and would not be significant.

Raptors and migratory birds could also be affected during Project operation, which would permanently convert approximately 2.6 acres of upland forest land and less than 0.2 acre of wetland forest to an herbaceous state along the pipeline right-of-way, and result in the permanent loss of 13.5 acres of upland forest and 2.6 acres of forested wetland at aboveground facilities and permanent access roads. Potential effects would include a reduction in available forest habitat associated with the conversion of forest land to open land on the permanent right-of-way possibly resulting in increased competition, a potential increase in parasitic bird species, edge effects (as previously discussed in section 4.5.1.1), and ongoing disturbances associated with periodic mowing and other right-of-way maintenance activities.

We received comments from the EPA on the draft EIS, including a recommendation that Transco consult with the Lancaster County Conservation District to adopt conservation practices like those implemented under the Conservation Reserve Enhancement Program, such as the use of native grasses, habitat buffers for upland birds, and food plots. EPA also recommended that where feasible, Transco replant using deer-resistant native shrubs and trees to assist regrowth and/or take protective measures given the overabundance of deer in the Project area. As indicated in table 4.4.1-3, construction of the Quarryville Loop would impact predominantly agricultural land (157.1 acres), as compared to the 6.1 acres of upland forest and 17.2 acres of open land that would be impacted in Lancaster County. As noted in section 4.4.4.1, following construction Transco would revegetate and restore upland and wetland vegetation in accordance with the measures outlined in its Plan and Procedures, using seed mixes recommended by the NRCS, local agencies or organizations, or relevant landowner agreements.

To avoid or reduce construction-related impacts on migratory birds, Transco consulted with the applicable FWS offices and the NJDEP to identify mitigation measures, including identifying the times of year when construction should be avoided. The agency-recommended migratory bird buffers and time of year restrictions are described in table 4.5.1-2. These measures as well as others described below are included as part of Transco's Final Migratory Bird Plan.

In addition to adhering to the time of year restrictions, because eagles are known to occupy the Project area, Transco would work closely with the appropriate agencies to determine if new nests are documented near the Project prior to or during construction. If additional bald eagle nests are identified, Transco would implement the measures recommended in the FWS' National Bald Eagle Management Guidelines to determine appropriate size and configuration of buffers to avoid or minimize construction-related impacts on the species (FWS, 2007a).

TABLE 4.5.1-2

Agency-Recommended Migratory Bird Buffers and Time of Year Restrictions

State/Species/ Group	Recommending Agency	Agency Recommendation	Time of Year Restrictions
PENNSYLVANIA			
Migratory birds	FWS – Pennsylvania Field Office	Avoid clearing during the nesting season for most native birds	April 1 to August 31
Bald eagle nests	FWS – Pennsylvania Field Office	If nests are documented near construction area, complete a Bald Eagle Project Screening form, per: https://www.fws.gov/northeast/pafo/pdf/Bald_Eagle_Project_Screening_Form.pdf	See https://www.fws.gov/northeast/pafo/pdf/Bald_Eagle_Project_Screening_Form.pdf and National Bald Eagle Management Guidelines (NBEMG)
NEW JERSEY			
Migratory birds	FWS – New Jersey Field Office	Avoid clearing vegetation during the primary nesting season for most native birds	April 1-August 31
Upland Sandpiper	NJDEP	Avoid clearing herbaceous vegetation during the nesting season for upland sandpiper, or conduct survey to confirm absence	Mid-April to mid-July
Bald eagle nests	FWS – New Jersey Field Office	Follow NBEMG	See NBEMG
Raptor nests	FWS	If tree and or shrub clearing is required during month of March, conduct raptor nest survey prior to clearing. If nests are identified during surveys, coordinate with New Jersey Field Office on appropriate nest protection measures	March 1 – March 31

As further discussed in section 4.5.1.1, Transco would install Dark Sky-compliant LED lighting at Compressor Station 206 and would direct the lighting downward to minimize impacts on sensitive wildlife. In addition, Transco would install a communication tower at the Compressor Station 206 site. Migratory birds are known to collide with towers during migration and can become confused or disoriented by lighting, or fly directly into the tower during nighttime migrations. Birds may also use the tower to build nests or as perches, which can be impacted by maintenance activities occurring during operation.

As outlined in its Final Migratory Bird Plan, Transco would adhere to the guidelines provided in the FWS (2000) Memorandum Service Guidance on the Siting, Construction, Operation and Decommissioning of Communication Towers, which includes adopting the following measures:

- Communication towers would be 199 feet or less above ground level.
- No lighting would be used on communication towers.
- Communication towers would be constructed in areas collocated with other Project facilities (i.e., compressor and regulator stations).
- Any security lighting would be down-shielded.

As discussed above, the FWS field offices provided recommendations regarding migratory bird avoidance and minimization measures (see table 4.5.1-2). Mitigation measures recommended by the agencies and additional details on the mitigation measures that Transco would adopt are found in the Final Migratory Bird Plan. Through Transco's consultation with the appropriate agencies and development of a plan to implement recommended avoidance and minimization measures, impacts on migratory birds would be further minimized.

4.5.1.3 Freshwater Aquatic Resources

The Project would involve 23 freshwater waterbody crossings and 3 freshwater/saline estuarine crossings, 12 in Pennsylvania and 14 in New Jersey. Waterbody crossings in Pennsylvania would include five minor, five intermediate, and two unclassified crossings. Waterbody crossings in New Jersey would include two minor, five intermediate, two major, and three unclassified crossings. In addition, the access road associated with Compressor Station 206 would involve installing a permanent culvert at two crossings of unnamed tributaries to the Delaware and Raritan Canal. Fish species commonly found in the waterbodies crossed by the Project are listed in table 4.5.1-3. A more detailed characterization of the freshwater waterbodies affected by the Project is provided in section 4.3.2. Compressor Station 200 and the proposed contractor yards would not affect fishery resources; therefore, these facilities are not described further in this section.

Fisheries of Special Concern

The FWS, PAFBC, and NJDEP were consulted to identify freshwater waterbodies that may contain federally or state-listed threatened, endangered, or candidate species and their habitats and other fisheries resources that could be considered fisheries of special concern (FWS, 2017a, 2017b; NJDEP, 2017a; PAFBC, 2016c). Based on these consultations, we determined that one waterbody (Fishing Creek) affected by the Project contains the state-listed Chesapeake logperch, which is further discussed in section 4.6.5.1. There are no waters designated as Essential Fish Habitat (EFH) that would be affected by the onshore portion of the Project in Pennsylvania or New Jersey.

Pennsylvania

As described in section 4.3.2, the PADEP classifies freshwater waterbodies according to water quality and aquatic communities. Under Pennsylvania Code Title 25, Chapter 93, waterbodies in the state are classified as coldwater fishes, warmwater fishes, migratory fishes, and trout stocked. Selected waterbodies are further classified as high quality or exceptional value and given special protection. Waterbodies that are classified as high quality exceed levels necessary to support fish, shellfish, wildlife, and recreation. Waterbodies classified as exceptional value are in significant natural areas, provide exceptional ecological significance, or are designated as a “wilderness trout stream.” The Project would cross 12 waterbodies classified as high quality. Table 4.3.2-3 identifies the classifications that apply to each waterbody crossed by the Project.

The PAFBC further classifies waterbodies supporting trout populations or providing habitat as Approved Trout Waters, Class A Trout Waters, Special Regulation Areas, Stream Sections that Support Natural Reproduction of Trout, and Wilderness Trout Streams. Trout streams and their applicable tributaries are the only streams with a PAFBC-recommended crossing window. All of the high-quality waterbodies affected by the Project also support trout fisheries.

In addition, based on consultations with the PAFBC, 12 waterbody crossings that may contain sensitive fisheries were identified in Pennsylvania (see section 4.3.2). Fisheries of special concern crossed by the Project and the standard PAFBC construction timing restrictions for these fisheries are listed in table 4.5.1-4.

TABLE 4.5.1-3

Representative Freshwater Fish Species in Waterbodies Crossed by the Onshore Portion of the Northeast Supply Enhancement Project

State/Species	
PENNSYLVANIA	
Warmwater Fishes	
Bluegill (*Lepomis macrochirus*)	Smallmouth bass (*Micropterus dolomieu*)
Largemouth bass (*Micropterus salmoides*)	White perch (*Morone americana*)
Rock bass (*Ambloplites rupestris*)	
Coldwater Fishes	
Brook trout (*Salvelinus fontinalis*)	Marginated madtom (*Noturus insignis)*
Brown trout (*Salmo trutta*)	Rainbow trout (*Oncorhynchus mykiss*)
Creek chub (*Semotilis atromaculatus*)	Redside dace (*Clinostomus elongates*)
Cutlip minnow (*Exoglossum maxillingua*)	Rosyside dace (*Clinostomus funduloides*)
Eastern blacknose dace (*Rhinichthys atratulus)*	Slimy sculpin (*Cottus cognatus*)
Longnose dace (*Rhinichthys cataractae*)	White Sucker (*Catostomus commersoni*)
Migratory Fishes	
Alewife (*Alosa pseudoharengus*)	Blueback herring (*Alosa aestivalis)*
American eel (*Anguilla rostrate*)	Striped bass (*Morone saxatilis*)
American shad (*Alosa sapidissima*)	
NEW JERSEY	
Channel catfish (*Ictalurus punctatus*)	Ironcolor shiner (*Notropis chalybaeus*)
Banded sunfish (*Ennaecanthus obesus*)	Mud sunfish (*Acantharchus pomotis*)
Black bullhead (*Ameiurus melas*)	Northern pipefish (*Syngnathus fuscus)*
Blackbanded sunfish (*Enneacanthus chaetodon*)	Redbreast sunfish (*Lepomis auritus*)
Bluespotted sunfish (*Enneacanthus gloriosus*)	Satinfish shiner (*Cyprinella analostana*)
Bluntnose minnow (*Pimephales notatus*)	Spotfin shiner (*Cyprinella spiloptera*)
Bridle shiner (*Notropis bifrenatus*)	Spottail shiner (*Notropis husdonius*)
Brown bullhead (*Ameiurus nebulosus*)	Striped bass (*Morone saxatilis*)
Comely shiner (*Notropis amoenus*)	Summer flounder (*Paralichthys dentatus*)
Common shiner (*Luxilis cornutus*)	Swallowtail shiner (*Notropis procne*)
Cutlip minnow (*Exoglossum maxillingua*)	Weakfish (*Cynoscion regalis*)
Eastern silvery minnow (*Hybognathus regius*)	White catfish (*Ictalurus catus*)
Fathead minnow (*Pimephales promelas*)	White perch (*Morone Americana*)
Golden shiner (*Notemigonus crysoleucas*)	Yellow bullhead (*Ameiurus natalis*)
Green sunfish (*Lepomis cyanellus*)	
Migratory Fishes	
Alewife (*Alosa pseudoharengus*)	American eel (*Anguilla rostrate*)
Freshwater/Saline Estuarine	
Northern pipefish (*Syngnathus fuscus*)	Weakfish (*Cynoscion regalis*)
Striped bass (*Morone saxatilis*)	White perch (*Morone Americana*)
Summer flounder (*Paralichthys dentatus*)	

Source: PADEP, 2010; PAFBC, 2016a, 2016b; Woodhead, 1991; Weston Solutions, Inc., 2009; NJDEP, 2016a; Foster, 2017.

TABLE 4.5.1-4

Freshwater Fisheries of Special Concern Crossed by the Northeast Supply Enhancement Project [a]

State/Facility	Milepost	Waterbody	Fisheries Concern [b]	Timing Restriction (No in-stream work allowed)
PENNSYLVANIA				
Quarryville Loop	1681.9	Wissler Run	HQ-WWF, MF	10/1 – 12/31 [c]
	1683.5	Fishing Creek	HQ-CWF, MF	3/1 – 6/15, 10/1 – 12/31 [c]
	1685.0	Unnamed Tributary to Fishing Creek	HQ-CWF, MF	10/1 – 12/31 [c]
	1685.7	Unnamed Tributary to Conowingo Creek	HQ-CWF, MF	10/1 – 4/1 [c]
	1686.5	Conowingo Creek	HQ-CWF, MF	10/1 – 4/1 [c]
	1686.7	Unnamed Tributary to Conowingo Creek	HQ-CWF, MF	10/1 – 4/1 [c]
	1687.4	Unnamed Tributary Conowingo Creek	HQ-CWF, MF	10/1 – 4/1 [c]
	1688.5	Unnamed Tributary to Stewart Run	HQ-CWF, MF	None [e]
	1689.4	Unnamed Tributary to Stewart Run	HQ-CWF, MF	None [e]
	1690.5	Unnamed Tributary to Bowery Run	HQ-CWF, MF	None [e]
	1681.9	Unnamed Tributary to Wissler Run [d]	HQ-WWF, MF	10/1 – 12/31 [c]
	1683.5	N/A [d]	HQ-CWF, MF	N/A [e]
NEW JERSEY				
Madison Loop	8.6	Unnamed Tributary to Tennent Brook	FW2-NT	5/1 – 7/31 [h]
	8.8	Unnamed Tributary to Tennent Brook	FW2-NT	5/1 – 7/31 [h]
	10.1	Unnamed Tributary to Cheesequake Creek	FW2-NT/SE1	4/1 – 7/31 [i]
	8.6	Unnamed Tributary to Tennent Brook [d]	FW2-NT	5/1 – 7/31 [h]
	9.3	Unnamed Tributary to Tennent Brook [d]	FW2-NT	5/1 – 7/31 [h]
	9.3	Unnamed Tributary to Tennent Brook [d]	FW2-NT	5/1 – 7/31 [h]
	9.0	Unnamed Tributary to Tennent Brook [d, g]	FW2-NT	5/1 – 7/31 [h]
	9.1	Unnamed Tributary to Tennent Brook [g]	FW2-NT	5/1 – 7/31 [h]
	9.2	Unnamed Tributary to Tennent Brook [d, g]	FW2-NT	5/1 – 7/31 [h]
	11.6	Crossway Creek [d, g]	FW2-NT/SE1	4/1 – 7/31 [i]
	11.7	Unnamed Tributary to Cheesequake Creek (Marina) [d, f, g]	FW2-NT/SE1	4/1 – 7/31 [i]
	9.1	Unnamed Tributary to Tennent Brook [d, g]	FW2-NT	5/1 – 7/31 [h]
Compressor Station 206	N/A [j]	Unnamed Tributary to Delaware and Raritan Canal	FW2-NT	5/1 – 7/31 [h]
	N/A [j]	Unnamed Tributary to Delaware and Raritan Canal	FW2-NT	5/1 – 7/31 [h]

[a] No freshwater waterbodies would be crossed by Compressor Station 200 or the onshore portion of the Raritan Bay Loop.

[b] Pennsylvania
HQ-WWF = High Quality, Warmwater Fishes
HQ-CWF = High Quality, Coldwater Fishes
TSF = Trout Stocked Fishery
MF = Migratory Fishes
New Jersey
FW2-NT = Freshwater, Non-trout Fishery
SE-1 = Saline Estuarine

[c] Timing restriction confirmed through consultation with PAFBC.

[d] Waterbody located within construction workspace; riparian zone disturbance only, no direct waterbody impact.

[e] No timing restriction per PAFBC.

[f] Hydrostatic test water source.

[g] Waterbody would be crossed via HDD. HDD tracking wires would be installed using foot traffic only and would require minimal removal of vegetation by hand clearing.

[h] Timing restriction confirmed through consultation with NJDEP, Division of Fish and Wildlife.

[i] Timing restriction pending confirmation with NJDEP, Division of Fish and Wildlife.

[j] NA = waterbody crossed by access road.

New Jersey

As described in section 4.3.2, in New Jersey, freshwaters are classified as Freshwater 1 (not subject to any man-made wastewater discharges) and Freshwater 2 waters (all other freshwaters except Pinelands waters). All of the waterbodies crossed by the Project in New Jersey are designated as Freshwater 2, Non-trout waters. Table 4.3.2-3 identifies the classifications that apply to each waterbody crossed by the Project. The "non-trout" designation generally applies to freshwaters that are not suitable for trout production or maintenance because of their physical, chemical, or biological characteristics.

Based on consultation with the NJDEP, 14 waterbody crossings that may contain sensitive fisheries were identified in New Jersey. Fisheries of special concern crossed by the Project and the standard NJDEP construction timing restrictions for these fisheries are listed in table 4.5.1-4.

Based on comments received from the NJDEP on the draft EIS, the timing restriction (no in-stream work allowed) for Cheesequake Creek and any Unnamed Tributary to Cheesequake Creek should be March 1 to July 31, due to the confirmed runs of anadromous fish (river herring) in Cheesequake Creek. Transco provided a response to NJDEP's comment on June 1, 2018 and noted that per New Jersey's FWPA rules at NJAC 7:7A (Table 5.7) and Flood Hazard Area Control Act rules at NJAC 7:13 (Table 11.5), the restricted time period for working in waters supporting both general game fish and anadromous fish (i.e., freshwater, non-trout, saline estuarine waters) is April 1 through July 1. Transco is coordinating with the NJDEP to determine the proper timing restriction for saline estuarine waterbodies. As required in our Procedures, Transco would be required to provide documentation from NJDEP for waterbody construction time windows that differ from the Procedures.

General Impacts and Mitigation

Construction impacts on freshwater aquatic resources may include: direct contact by construction equipment with fish, fish eggs, and other aquatic organisms including fish prey and forage species; alteration or removal of adjacent riparian vegetation and aquatic habitat cover; introduction of pollutants; and impingement or entrainment of fish and other biota associated with the use of water pumps, including appropriation of hydrostatic test water. Loss of riparian vegetation in forested areas could affect fish populations that may be present downstream of construction activities by reducing shade and cover and increasing water temperature. Construction could also delay migrating fish from reaching upstream spawning areas or delay downstream movement of juveniles.

The greatest potential impacts of construction on fishery resources would result from an increase in sediment loading and turbidity within and immediately downstream of the construction work area including an inadvertent drilling mud release, downstream scour associated with diverting water around the work area, or discharge of hydrostatic test water. Increased levels of sedimentation could adversely affect fish eggs and juvenile fish survival, benthic community diversity and health, and spawning habitat. Transco would complete all in-stream work during agency-specified construction windows, and would also implement other measures outlined in its Procedures to reduce sedimentation and enhance restoration. Therefore, impacts on fisheries associated with waterbody crossings would be minor, temporary, and limited primarily to the area of the crossings.

Long-term impacts on fishery resources could occur if the stream contours are permanently modified in the area of the crossing or the adjacent riparian vegetation does not recover. Transco proposes to reduce effects on fishery resources through the use of the various waterbody crossing methods and restoration procedures described in section 2.3.2.1 and by minimizing the duration of in-stream work in accordance with its Procedures.

Based on the geotechnical investigations completed to date, shallow bedrock is not expected to be encountered during trenching for the onshore pipeline facilities and, as such, Transco does not anticipate that blasting would be required at any waterbody crossing. However, if conditions are encountered that warrant the use of controlled blasting, Transco would implement its Blasting Plan that outlines proper precautions to be implemented to minimize potential impacts. In addition, Transco would acquire the appropriate federal, state, and local permits prior to the use of blasting.

Impacts on fisheries would be reduced further by limiting in-stream work to the time periods required by federal and state agencies (see table 4.5.1-4). For waterbodies that do not have a specific timing restriction, Transco would adhere to the in-stream construction timing restrictions included in its Procedures (measure V.B.1). We find that implementing these timing restrictions would minimize impacts on fish species in the Project area.

Transco proposes to construct across all waterbodies with perceptible flow at the time of crossing using dry-ditch methods (i.e., flume, dam and pump, temporary diversion channel method, or HDD), which maintain the flow of the waterbody during the crossing. The HDD is a trenchless method where the pipeline is installed beneath the waterbody without impacting the stream bed or banks. The dam-and-pump method involves isolating the flow of the waterbody from the construction area and trenching through the stream bed and banks under drier conditions. Additional details concerning these construction methods are included below and in section 2.3.2.1. Table 4.3.2-3 includes the unique identification number, waterbody name, milepost, crossing width, fishery type, FERC classification, state water classification, and proposed crossing method for each waterbody.

We expect streambeds and banks to quickly revert to preconstruction conditions. Transco's commitment to conduct restoration, bank stabilization, and revegetation efforts in accordance with its Procedures and all applicable state and federal permits would minimize the potential for erosion from the surrounding landscape. All temporary work areas would be restored and allowed to revegetate to original conditions, with the exception of forested areas, which would be converted to open, herbaceous vegetation, and at aboveground facilities and permanent access roads. No long-term impacts are anticipated after restoration of stream bottoms and regrowth of stream bank and aquatic vegetation. In the event that vegetation maintenance during operation would be required along specific streambanks, impacts on fisheries would be minor. By implementing the above measures, Project-related impacts on fisheries would be minimized.

<u>Horizontal Directional Drill Crossing Method</u>

Potential impacts on freshwater aquatic resources associated with HDD crossings include erosion or sedimentation associated with the onshore operation of the HDD equipment and inadvertent releases of drilling fluids and associated impacts on water quality and aquatic organisms.

HDD entry and exit points are typically located away from the waterbodies crossed to minimize potential impacts. Drilling fluid consists of non-toxic materials which may leak through unidentified fractures below the surface, either along the path of the HDD or in adjacent areas. The majority of inadvertent releases occur close to the HDD entry or exit points; however, drilling fluid could also be released into a waterbody and settle on the stream bed, temporarily inundating aquatic species habitats. Benthic and less mobile resources as well as spawning and nursery habitat could be impacted from the settling of drilling fluid. In addition, increased sedimentation and turbidity within waterbodies could impact predator/prey interactions and reproductive success. To prevent and control inadvertent releases of drilling fluids, Transco would implement its Onshore Horizontal Direction Drill Contingency Plan, which includes measures to monitor the drilling operation and drill path to identify inadvertent returns, minimize the duration of any releases that occur, and contain and clean up any spills.

Dry-ditch Method

The impacts of dry-ditch methods on fishery resources could include:

- increased sedimentation and water turbidity immediately downstream of the construction work area;
- direct contact with relatively immobile prey organisms (e.g., benthic and epibenthic) that may be food resources for fish;
- alteration or removal of aquatic habitat cover;
- introduction of pollutants through possibly contaminated bottom sediments or spills of fuels or lubricants;
- impingement or entrainment of fish and other biota associated with the use of water pumps at dam and pump crossings; and
- downstream scour associated with use of pumps or flume discharge.

In addition, removal of streamside vegetation at the crossings may reduce shading of the waterbody, diminish escape cover, and could, in small areas where flow is minimal or constrained, result in locally elevated water temperatures.

The use of dry-ditch construction methods would reduce potential erosion and sedimentation within the stream channel by confining impacts to the construction work areas and minimizing impacts on downstream reaches. While several factors can influence the effectiveness of dry-ditch methods across waterbodies, if the crossings are properly installed and maintained during construction and restoration, the levels of sediment and turbidity produced are typically minor. Based on a literature assessment of magnitude and timing of suspended sediment produced from open-cut dry-ditch methods (Reid and Anderson, 1999), the duration of increased sedimentation associated with construction across the waterbody would be mostly temporary (i.e., less than 1 to 4 days) and remain near the crossing location (i.e., an approximate downstream distance of a few hundred feet). The likely range of effects on aquatic resources in the Project area can be approximated by applying this predicted suspended sediment to the Newcombe and Jensen model (Newcombe and Jensen, 1996). Results from this model suggest a very low probability of fish mortality from construction, with local crossing area impacts consisting of mostly sublethal effects (e.g., short-term physiological stress and reduction of feeding), and limited habitat degradation. Transco would also implement the erosion and sedimentation control measures described in its Plan and Procedures to minimize impacts on aquatic resources due to changes in water quality.

Use of a dry-ditch technique would have a direct impact on benthos and alteration of aquatic habitats. The impact would result from installation and removal of the temporary dams built to isolate the construction work areas, and from excavation of the pipeline trench. Installation of the temporary dams typically involves the placement of sand bags or equivalent dam diversion structures upstream and downstream of the construction work areas. The footprint of the dams is typically small but would temporarily bury existing benthic organisms within the footprint of the dams. Excavation of the pipeline trench would also directly impact existing benthos through removal and temporary stockpiling of bottom sediment in upland areas. These effects would be limited to a relatively small area. Following installation of the pipeline, the bed and banks would be restored and the temporary dams would be removed. The pipeline trench would be backfilled with the original sediment, restoring similar habitat conditions. Both the restored stream bed and the area beneath the dams would likely be colonized fairly quickly by benthic species from the adjacent areas of the waterbody.

The use of pumps to maintain stream flow around the construction work areas could entrain or impinge fish and other aquatic invertebrates. This potential impact would be minimized by screening the intakes of the pumping system, as described in Transco's Procedures. Appropriately sized screens or water intakes to avoid entrainment of sensitive species would also be used; however, some small fish and larvae as well as all forms of aquatic invertebrates would still be subject to entrainment, although the duration of this effect would be temporary and would cease when the crossing is completed and normal streamflow is restored.

The dam and pump crossing method could also result in sediment scour downstream of the crossing if measures were not implemented to dissipate the energy of the pump discharge. As described in its Procedures, Transco would direct all discharges from the pumps through containment structures such as hay bales and/or filter bags located in well-vegetated upland areas to lower discharge velocity and reduce the potential for erosion. Water would not be discharged to the waterbody until after filtration or settling through an approved holding structure to avoid affecting water quality.

The use of the dam and pump crossing method could also temporarily restrict fish passage during the time it takes to install the pipeline. This temporary and localized interruption of fish passage is not anticipated to dramatically affect the migration of fish within the stream systems that would be crossed by the Project.

Impacts resulting from tree clearing adjacent to each crossing could increase the potential for sediment to enter the waterbody. Following the installation of the pipeline, streambanks would be restored, stabilized with erosion control measures, and revegetated.

Following construction, Transco would allow a 25-foot-wide riparian strip along each waterbody bank to revegetate with native flora in order to stabilize banks, reduce erosion impacts, and provide shading and cover for fisheries resources; however, a 10-foot-wide corridor may be permanently maintained in an herbaceous state directly above the pipeline, except in areas crossed by trenchless methods. Restricting the herbaceous vegetation area to a small portion of the total right-of-way clearing would allow much of the ecological function of the riparian conditions (e.g., bank stabilization, filtration, shade, future large wood, and organic input) to more quickly return. Stream bank shrub and tree species would be expected to recover over several months to a few years. As discussed in section 2.5.4, restoration would be considered successful if the right-of-way vegetation is visually similar in density and cover of non-nuisance vegetation, surface conditions are similar to adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. For at least 2 years following construction (3 years in wetland areas), Transco would submit quarterly reports to the FERC that document any problems identified during the inspections or by landowners, and describe the corrective actions taken to remedy those problems. We would also conduct periodic inspections until restoration is deemed complete. Streambed biota, such as invertebrates that serve as food sources for fishes, would be expected to recolonize the affected areas within days to months (Brooks and Boulton, 1991; Matthaei and Townsend, 2000) or longer for some species (Wallace, 1990). This would limit the overall long-term impacts of loss of riparian habitat to a small portion of each stream crossed, reducing future negative effects to aquatic biota.

<u>Hydrostatic Test Water</u>

To comply with DOT regulations, Transco would conduct hydrostatic testing of the pipeline prior to placing it into service. As described further in section 4.3.2.6, Transco proposes to use one waterbody in New Jersey (an unnamed tributary to Cheesequake Creek) as a source of hydrostatic test water for the

Madison Loop. Hydrostatic test water for the Quarryville Loop and Raritan Bay Loop would be obtained from municipal sources.

Transco would mitigate impacts of hydrostatic water withdrawals and discharges on aquatic resources by adhering to its Procedures, and would conduct activities in accordance with applicable regulatory requirements, including monitoring receiving waters before and after discharge for contaminants. Intake hoses would be screened to minimize entrainment or impingement of aquatic species, and withdrawal rates would be regulated to maintain downstream flows. No chemicals or additives would be added to the water except where necessary to eradicate non-native aquatic species and the rate of discharges of hydrostatic test water would be regulated to minimize erosion. Diffusers or other dissipation devices would be used to reduce the energy of the discharge and prevent scouring of streambeds. Transco would direct upland discharges into a filter bag or other erosion-control barrier to trap sediments.

<u>Spill Prevention, Control, and Countermeasures</u>

Accidental spills of construction-related fluids (e.g., oil, gasoline, or hydraulic fluids) into waterbodies could result in water quality effects that affect fish and other aquatic organisms. The potential impact would depend on the type and quantity of the spill, and the dispersal and attenuation characteristics of the waterbody. Minimization and mitigation procedures related to water quality are described in section 4.3.2.7. To reduce the potential for surface water contamination and resulting effects on aquatic life, Transco would implement the measures in its Spill Plan, which include conducting routine inspections of construction equipment, tanks, and storage areas to help reduce the potential for spills or leaks; restricting refueling and the handling of hazardous materials to greater than 100 feet from wetland and waterbody resources; and the use of secondary containment around all containers and tanks. With adherence to these measures, effects on aquatic resources from potential spills would be adequately minimized.

4.5.2 Offshore Resources and Habitats

This section identifies and describes the various wildlife and aquatic species associated with the habitats crossed by the offshore segment of the Raritan Bay Loop.

4.5.2.1 Submerged Aquatic Vegetation

Submerged aquatic vegetation, or seagrass, generally includes rooted vascular plants that grow up to the water's surface, but not above it. These plants are important components of estuarine ecosystems, performing a number of ecological functions that range from chemical cycling and physical modification of the water column and sediments to providing food and shelter for commercially, recreationally, and ecologically important organisms. However, over the past several decades there have been severe declines in submerged aquatic vegetation in the bays and estuaries along the U.S. Atlantic coast, due to factors such as excess nutrients, increased suspended sediment from dredging activities and coastal development, runoff of herbicides/industrial pollutants, improper shellfish harvesting, boat-generated waves, and boat propeller scarring (EPA, 2006). In the Project area, eelgrass (*Zostera* spp.) was historically abundant along the shoreline. However, a marine slime mold infection in the early 1930s, combined with declining water quality, destroyed about 90 percent of the eelgrass population (New York-New Jersey Harbor & Estuary Program, 2012; USACE and NYNJPA, 2016). Presently, eelgrass has been virtually eliminated from the New York Bight area, with only a few small beds remaining (USACE and NYNJPA, 2016).

Sea lettuce (*Ulva lactuca*) was once abundant along the entire shoreline of Raritan Bay (MacKenzie, 1990). In the past few decades, sea lettuce has proliferated in estuaries around the world due to excess runoff of nutrients (e.g., from fertilizers, sewage) (MacKenzie, 2000). Sea lettuce is a mat-forming macroalgae and is a food source for some bird species. However, high concentrations of sea lettuce are thought to degrade the environments of estuaries, because few macroinvertebrates grow on its surface, and few species are able to live beneath the mats (MacKenzie, 2000; MacKenzie, 2005).

No submerged aquatic vegetation beds were identified within the offshore workspace during Transco's 2016 benthic survey. Additionally, the nearshore portion of the Raritan Bay Loop would be installed via HDD, avoiding areas where submerged aquatic vegetation would be most likely to occur. The only potential impact on submerged aquatic vegetation would be from an inadvertent release of drilling fluid in the near shore areas during the Morgan Shore Approach HDD. However, the measures in Transco's Horizontal Directional Drill Contingency Plans (see table 2.3-3) would minimize the potential impacts of inadvertent releases during construction.

4.5.2.2 Plankton

Plankton (phytoplankton and zooplankton, including ichthyoplankton) are small free-floating or weakly swimming organisms that drift in the water column. Phytoplankton (i.e., microscopic algae and protozoa) occurrence is generally limited to the photic zone, where light permeates the water sufficiently for photosynthesis to occur (Quigg and Wardle, 2004; Campbell et al., 1999). The distribution and abundance of phytoplankton is also limited by temperature, salinity, and chemical factors (e.g., the availability of oxygen, nitrogen, phosphorus). During periods of nutrient upwelling and/or increased light, phytoplankton populations can dramatically increase, resulting in "blooms." These events commonly occur during the spring and fall. During the spring and fall blooms, phytoplankton densities increase from approximately 10,000,000 to 10,000,000,000 individuals per liter (0.3 gallon) in Raritan Bay and the lower Hudson River estuary. The species *Skeletonema costatum* tends to be most abundant (FWS, 1997).

We received comments on the draft EIS with concerns about the potential for the Project to create conditions conducive to the growth of Harmful Algal Blooms (HABs) in the region. HABs can produce toxins that kill marine organisms and impact human health, and cause substantial ecological and socioeconomic impacts. HABs are a natural phenomenon in coastal environments, but anthropogenic activities such as nutrient loading, altering food webs through overfishing, increased aquaculture, watershed land-use changes, and modifications to water flow are thought to contribute to the increased frequency of some types of HABs (Jewett et al., 2007). The specific causes of HABs are not well understood due to the complex interaction of biological, chemical, and physical factors that influence bloom development (Jewett et al., 2007). The Raritan Bay portion of the Project area is a relatively shallow bay whose main source of fresh water is the impaired Raritan River. Natural flushing of Raritan Bay is inhibited by the presence of shoals in the area, and the Sandy Hook peninsula limits tidal exchange with the Atlantic Ocean to some degree. These natural conditions are conducive to the formation of HABs, and over the past several decades, HABs of various species have occurred in the Project area. The potential impacts of the Project on HAB occurrence and frequency are discussed in section 4.5.2.8.

Zooplankton (i.e., planktonic animals) abundance is related to the spawning periods of fish and invertebrate species, increases in phytoplankton populations, and temperature changes. For most of the year, copepods dominate the Raritan Bay and Lower New York Bay, with the exception of the summer, when meroplankton (organisms that only spend a portion of their life in a planktonic stage) dominate (FWS, 1997). Examples of meroplankton include the larval stages of sea urchins, sea stars, crustaceans, and most finfish (e.g., ichthyoplankton). In Raritan Bay and Lower New York Bay, meroplankton abundance ranges from approximately 1,000 to 400,000 individuals per cubic meter (264.2 gallons), whereas copepod abundance ranges from approximately 1,000 to 90,000 individuals per cubic meter (FWS, 1997). Distribution of ichthyoplankton is highly dynamic and varies seasonally and spatially. Seasonal patterns are determined by spawning cycles, while spatial distribution depends on currents and species boundaries.

4.5.2.3 Benthic Communities

Marine benthic invertebrates live on the seafloor or in the sediment. Benthic organisms that reside on, or are attached to, the seafloor or firm surfaces are referred to as *epifauna*, and include mussels, barnacles, and many species of shrimp, crabs, and lobsters. Benthic organisms that reside in the sediment, either in tubes, permanent burrows, or nests, are called *infauna*. These include certain types of polychaete and oligochaete worms, most clams, and many crustaceans. Benthic organisms are integral parts of marine food webs, and temporal and spatial variations in benthic community structure can affect the distribution and abundance of commercially and recreationally important species that feed on the bottom (Stevenson et al., 2004; FWS, 1997). The benthic organisms of the New York Bight make up a large portion of the biomass of the continental shelf ecosystem and play a large role in the flow of energy and material throughout the food web (FWS, 1997).

Between 2005 and 2012, the USACE conducted benthic surveys in the vicinity of the Project area as part of the New York and New Jersey Harbor Deepening Project. At sampling sites within portions of the Ambrose Channel in 2005, the benthic community density ranged from 160 to 12,460 organisms per square meter (10.8 square feet) prior to dredging (USACE, 2011). Blue mussel (*Mytilus edulis*) dominated the assemblage (86 percent of the total), but other contributors to the benthic community included amphipods (Gammaridae), polychaetes (*Nephtys* sp. and *Magelona* sp.) and the bivalve *Tellina agilis* (northern dwarf tellin). At sampling sites in navigational areas farther from the Raritan Bay Loop route (i.e., Upper New York Bay, Newark Bay, and connecting channels), benthic densities in 2005 ranged from 295 to 61,411 organisms per square meter (10.8 square feet) (USACE, 2011; 2013a). Similar densities were observed in these areas during post-dredging surveys. However, average density increased in several areas, likely due to opportunistic species colonizing the areas disturbed by dredging (USACE, 2013a).

In the fall of 2016 and spring of 2017, Transco conducted a baseline benthic survey to characterize the benthic community along the Raritan Bay Loop. Samples were collected at 75 stations along the proposed pipeline route, including the proposed Subsea Anode Sled location approximately 1,200 feet north of the route near the New Jersey shoreline. At each sampling station, three grab samples were collected: one centered on the proposed pipeline corridor, one about 33 feet (10 meters) to the north of the central sample, and one about 33 feet (10 meters) to the south of the central sample. A modified Day grab sampler was used to collect the samples from 1 square foot (0.1 square meter) sections of the seafloor. Benthic organisms collected in the samples were then identified to the lowest practical taxon.

We received several comments expressing concern that the extent of the offshore sampling program was insufficient to characterize the benthos and the chemical properties of sediments that would be disturbed within the proposed 14,165.5-acre offshore construction workspace. However, as discussed in section 2.2, the offshore workspace encompasses a 5,000-foot-wide area centered on the Raritan Bay Loop, largely to provide enough room for spread anchoring of construction vessels. Therefore, the 14,165.5-acre workspace does not represent the area of seafloor that would be directly disturbed by construction. Rather, we estimate that only 87.8 acres (0.6 percent) of seafloor within the 14,165.5-acre area would be directly impacted by construction (excavations, pipelay, anchoring systems, and backfilling) of the Raritan Bay Loop. Also, the initial offshore sampling program was conducted in accordance with a detailed plan that was reviewed by the NJDEP and NYSDEC and that included a review of historical dumping activities in Raritan and Lower New York Bay. At the request of the NJDEP and USACE, Transco conducted additional sediment sampling in 2018 to further characterize dredge spoil for disposal at onshore facilities in New Jersey or for possible disposal in the HARS (see table 4.5.2-3 in section 4.5.2.8). For the above reasons, we conclude that the offshore sampling program conducted by Transco was sufficient to characterize the benthic community, sediment composition, and chemical properties of sediments disturbed by construction and to evaluate the potential impacts of construction-related sedimentation on aquatic resources.

The results of Transco's sediment sampling indicate that the seafloor crossed by the proposed Raritan Bay Loop consists of primarily sandy sediments in Lower New York Bay, and a higher proportion of fine sediments like silt and clay in Raritan Bay. The survey identified 208 taxa, including annelids, crustaceans, round worms, ribbon worms, gastropods, bivalves, and shrimp. The polychaete *Mediomastus ambiseta* had the highest relative abundance (56.8 percent) in the samples. Average benthic invertebrate densities ranged from about 20 to 4,000 organisms per square foot (0.1 square meter). Taxonomic richness was relatively low and ranged from 5 to 28 species (mean = 17.2). These relatively low richness values are typical for dynamic, stressed conditions in nearshore environments. The highest benthic invertebrate abundances were observed in the western portion of the Project area. Of the 20 sampling stations with the highest abundance, all but 1 was located west of the Chapel Hill Channel. Greater diversity was generally found at stations in the eastern portion of the Project area, and was associated with sandy habitat.

As part of the baseline benthic survey, Transco also collected side-scan sonar data along the Raritan Bay Loop. This survey identified 420 potential hardbottom targets within the proposed offshore workspaces, for a total of about 7 acres of hardbottom habitat. After further investigation of these targets, Transco concluded that they consist of larger rock or debris mounds, possible small boats, pipe sections, and other unidentified objects. Northern star coral (*Astrangia poculata*) is a temperate coral that is known to occur on hard bottom habitats in the New York Bight. Northern star coral is a sessile, filter-feeding organism that requires hard substrate for colonization. The species was identified on hard substrate seaward of the Rockaway Peninsula during benthic surveys in 2009 and 2010 (Ecology & Environment, 2009; 2011), but was not observed along the Raritan Bay Loop during Transco's 2016 survey.

Benthic invertebrate species of commercial and recreational value (e.g., shellfish) are discussed in section 4.5.2.4 below.

4.5.2.4 Fisheries Resources

Areas of the New York Bight have been important fishing grounds since the settlement of North America (McHugh, 1977) and the region continues to produce commercial quantities of fish and shellfish, as well as support a considerable amount of saltwater sport fishing activity (see sections 4.8.5.2 and 4.8.6). Contributing factors to the area's diversity and production are the vast amount of relatively shallow continental shelf waters and a number of estuary systems (such as Raritan Bay) that nurture and protect estuarine-dependent fish.

The Project area supports numerous fish and invertebrate species managed by the NMFS under the MSA. Specifically, EFH is designated for 33 species in the vicinity of the Raritan Bay Loop (see section 4.5.3 for discussion of EFH and the MSA).

The Raritan Bay Loop would also cross approximately 8.1 miles (13 kilometers) of the FWS-designated Raritan Bay-Sandy Hook Bay Significant Habitat Complex between MPs 12.1 and 20.1. This complex encompasses Raritan and Sandy Hook Bays from the southeastern portion of the New York-New Jersey Harbor between the southern shoreline of Staten Island, New York and the northern shoreline of Monmouth County, New Jersey (FWS, 1997). The complex is significant because of its geographic location and the variety and quality of its habitat types, which support regionally rare and important marine, estuarine, and anadromous species (FWS, 1997).

Fish

The waters of the offshore Project area support diadromous (fish that migrate between fresh and salt water) and marine finfish species of ecological, commercial, and recreational importance. The shelf waters of the New York Bight also serve as spawning grounds for many economically important species and as nursery grounds for their early development stages. Table 4.5.2-1 lists example fish species that are representative of the Project area, such as commercially and recreationally harvested species, forage fish species, species with designated EFH, and protected species known to occur in the Project area. It is not intended to be a comprehensive list of all fish species potentially present in the Project area.

TABLE 4.5.2-1

Fish Species Representative of the Raritan Bay Loop Area

Species Name	Species Name
Alewife (*Alosa pseudoharengus*)	Ocean pout (*Macrozoarces americanus*)
American eel (*Anguilla rostrata*)	Red hake (*Urophycis chuss*)
American sand lance (*Ammodytes americanus*)	Round herring (*Etrumeus sadina*)
American shad (*Alosa sapidissima*)	Sand tiger shark (*Carcharias taurus*)
Atlantic angel shark (*Squatina dumeril*)	Sandbar shark (*Carcharhinus plumbeus*)
Atlantic bluefin tuna (*Thunnus thynnus*)	Scup (*Stenotomus chrysops*)
Atlantic butterfish (*Peprilus triacanthus*)	Shortfin mako shark (*Isurus oxyrinchus*)
Atlantic cod (*Gadus morhua*)	Shortnose sturgeon (*Acipenser brevirostrum*)
Atlantic herring (*Clupea harengus*)	Silver hake (whiting) (*Merluccius bilinearis*)
Atlantic mackerel (*Scomber scombrus*)	Skipjack tuna (*Katsuwonus pelamis*)
Atlantic menhaden (*Brevoortia tyrannus*)	Smooth dogfish (*Mustelus canis*)
Atlantic silverside (*Menidia menidia*)	Spanish mackerel (*Scomberomorus maculatus*)
Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*)	Spiny dogfish (*Squalus acanthias*)
Bay anchovy (*Anchoa mitchilli*)	Spot (*Leiostomus xanthurus*)
Black sea bass (*Centropristis striata*)	Striped bass (*Morone saxatilis*)
Blueback herring (*Alosa aestivalis*)	Striped killifish (*Fundulus majalis*)
Bluefish (*Pomatomus saltatrix*)	Summer flounder (*Paralichthys dentatus*)
Blue shark (*Prionace glauca*)	Tautog (blackfish) (*Tautoga onitis*)
Clearnose skate (*Raja eglanteria*)	Tiger shark (*Galeocerdo cuvier*)
Cobia (*Rachycentron canadum*)	Weakfish (*Cynoscion regalis*)
Dusky shark (*Carcharhinus obscurus*)	Windowpane flounder (*Scophthalmus aquosus*)
Hickory shad (*Alosa mediocris*)	Winter flounder (*Pseudopleuronectes americanus*)
King mackerel (*Scomberomorus cavalla*)	Winter skate (*Leucoraja ocellata*)
Little skate (*Raja erinacea*)	Witch flounder (*Glyptocephalus cynoglossus*)
Monkfish (*Lophius americanus*)	Yellowtail flounder (*Limanda ferruginea*)

As discussed in sections 4.7.5.2 and depicted on figure 4.5.2-1, the workspace associated with construction of the Raritan Bay Loop would cross seven recreational fishing grounds including Tin Can, Scallop Ridge, Between the Channels, Gong, Unnamed Fishing Channel, Ambrose Channel, and Sandy Hook Channel (NJDEP, 2003d). These areas are located in New Jersey and New York state waters between the Sandy Hook and the Rockaway peninsulas and are designated as "prime fishing areas" by New Jersey (NJAC 7:7-9.4). Several other sport ocean fishing grounds are less than 1 mile from the proposed offshore workspace, including the Rockaway Reef, an artificial reef site managed by the NYSDEC Marine Artificial Reef Program.

Mollusks

The offshore Project area is home to a number of mollusk species, including the Atlantic surfclam (*Spisula solidissima*), hard clam (*Mercenaria mercenaria*), soft clam (*Mya arenaria*), blue mussel (*Mytilus edulis*), and eastern oyster (*Crassostrea virginica*). Long-finned squid (*Doryteuthis [Amerigo] pealeii*) are also harvested in the nearshore environment in the summer and fall (NMFS, 2015a).

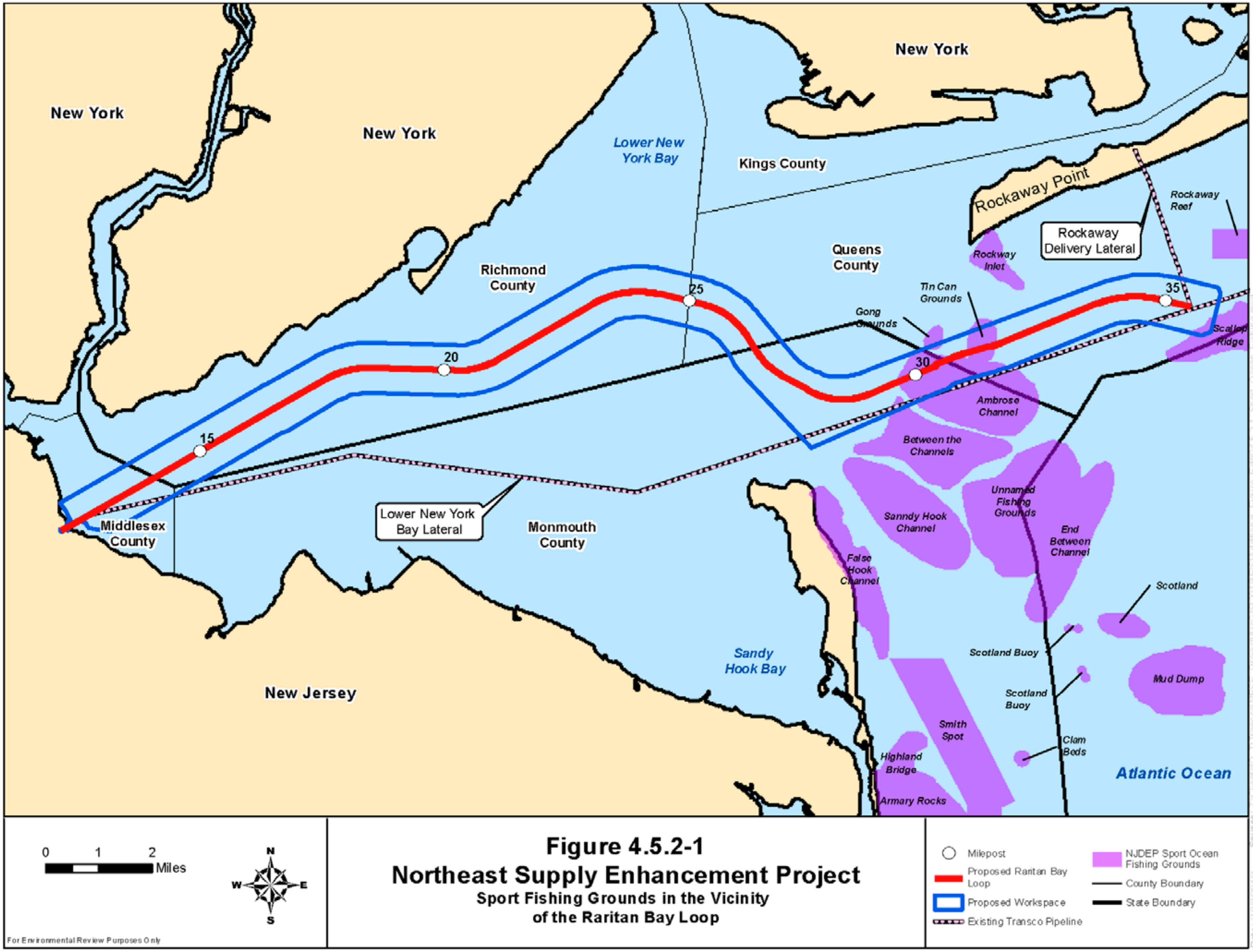

Figure 4.5.2-1
Northeast Supply Enhancement Project
Sport Fishing Grounds in the Vicinity of the Raritan Bay Loop

Shellfish harvesting is regulated by New Jersey and New York based on the sanitary conditions of the surrounding waters (NJAC 7:12; 6 NYCRR Parts 41 and 42). In New York, harvest area classifications are: certified (open), uncertified (closed), seasonally certified, and special permit (which allows harvest in an uncertified area). In New Jersey, the classifications consist of: approved, seasonally approved, special restricted, seasonal special restricted, and prohibited. All of the New Jersey state waters crossed by the proposed Raritan Bay Loop are currently classified as prohibited for shellfish harvest, though in the waters crossed to the north of Sandy Hook, the NJDEP issues permits that allow the harvest of surf clam for bait purposes only. The NJDEP also issues permits such that shellfish may be harvested from restricted areas for relay and depuration. The relay process involves moving the clams into cleaner environments for a period of time, which allows for natural filtering activity to expel contaminants from the shellfish. The nearest New Jersey depuration harvest zone is more than 2,625 feet (800 meters) from the nearest proposed dredging location along the Raritan Bay Loop route centerline. In New York waters, greater than 90 percent of the Raritan Bay Loop would cross waters classified as uncertified; however, a portion of this area is a special permit area where NYSDEC issues permits for the harvest of surf clam to be used for bait. In New York state waters, the Raritan Bay Loop would cross certified waters from near MP 34 to the Raritan Bay Loop tie-in with the RDL (i.e., the Rockaway Transfer Point, MP 35.5).

In the fall of 2014, the NJDEP Bureau of Shellfisheries conducted a stock assessment of hard clam in New Jersey state waters in Raritan and Sandy Hook Bays (Dacanay, 2016). Sampling took place at a total of 206 stations using a hydraulic clam dredge. These stations were previously surveyed by the NJDEP in 1983 and 2000 (McCloy and Joseph, 1984; Celestino, 2003). The 2014 survey identified high hard clam abundance in the majority of Raritan and Sandy Hook Bays, and a significant increase in hard clam abundance in Raritan Bay compared to the 2000 survey effort. In contrast to the previous surveys, which showed a more comprehensive distribution throughout Raritan Bay, soft clams were only observed in a small area near Atlantic Highlands, New Jersey in southern Sandy Hook Bay. Blue mussels were found to be widely distributed throughout both Raritan and Sandy Hook Bays. Eastern oysters were not identified at any of the sampling stations in 2000 or 2014, despite being present in the 1983 survey. Atlantic surf clams were observed primarily on Flynn's Knoll (a shallow area near the tip of Sandy Hook) and the southeastern shoreline of Sandy Hook Bay, with two additional small surf clams areas in central Raritan Bay. During benthic surveys conducted by Transco as part of the Rockaway Delivery Lateral Project in 2009 and 2010, Atlantic surf clam was one of the most prevalent species near the Rockaway Transfer Point (Ecology & Environment, 2009; 2011). A NYSDOS survey conducted in 2012 confirmed the persistence of a relatively dense patch of surf clam in New York waters seaward of the Rockaway Peninsula (NYSDOS, 2013). However, post-construction surveys for the Rockaway Delivery Lateral Project suggest that the concentration of surf clam in this area may be declining (Ecology & Environment, 2016).

Transco's 2016 benthic survey for the NESE Project identified surf clam and hard clam along the proposed Raritan Bay Loop. Surf clam were observed at nearly every sampling station from approximately MP 25 eastward, and hard clam were observed at nearly every sampling station from MP 25 westward. Soft clam and blue mussel were also observed in low numbers in Transco's samples. Eastern oyster were not observed at any of the sampling stations.

During Transco's consultation with the NYSDEC, the agency stated that the portion of the Raritan Bay Loop between MPs 14.4 and 21.6 near Staten Island would cross the most productive hard clam area for Raritan Bay in New York waters. The area is currently designated as uncertified, but it was previously commercially harvested under special permit as part of the NYSDEC transplantation program, yielding about half of all New York State hard clam landings. No hard clam harvesting has occurred in this area since 2013, though NYSDEC has indicated that it may reinitiate the transplantation program in the future if economically feasible. To evaluate this area, Transco used its 2016 benthic survey results to analyze hard clam density between MPs 14.4 and 21.6 of the Raritan Bay Loop. Based on a total area sampled of 48 square feet (4.5 square meters), Transco estimated that the hard clam density in this area is approximately

69.6 individuals per square foot. The majority (approximately 74 percent) of hard clam individuals collected in this area were less than 1 inch (25 millimeters) in size. In section 3.3 we evaluate a route alternative for the Raritan Bay Loop recommended by the NYSDEC to potentially reduce impacts on hard clams between MPs 14.4 and 21.6.

We received one scoping comment concerning the potential for the Project to impact oyster restoration projects in Raritan Bay. No oyster restoration sites have been identified within the proposed Project workspaces. NY/NJ Baykeeper formerly maintained oyster reef projects in Keyport Harbor and the Navesink River, but these projects were removed following the NJDEP's 2010 decision to ban research, restoration, and education projects using oysters in contaminated waters or waters classified as restricted or prohibited for shellfish harvest. The intent of the ban was to minimize the potential health risks of illegal shellfish harvesting or poaching. As a result of the ban, oyster restoration projects are prohibited in the vast majority of New Jersey state waters in the New York-New Jersey Harbor. Following the ban, NY/NJ Baykeeper initiated oyster restoration and research projects at the Naval Weapons Station Earle because, due to the facility's 24/7 security, it is not subject to the NJDEP ban. The Naval Weapons Station Earle is located several miles from the Project area, and would not be affected by the Project. Additionally, in 2011-2012, NY/NJ Baykeeper and Rutgers University's Center for Urban Environmental Sustainability conducted mapping of over 30 miles of New York and New Jersey shoreline in Raritan Bay to identify locations suitable for future oyster reintroduction (Ravit et al., 2014). The study identified several suitable oyster restoration locations in shallow waters along the New Jersey shoreline, all of which are well outside the Project area. Based on this information, we conclude that the Project would not affect current or future oyster restoration activities in the region.

We received comments on the draft EIS about the potential for the Project-related disturbances to increase the spread of the Quahog Parasite Unknown (QPX) parasite in hard clams. QPX disease is discussed in section 4.5.2.8.

Crustaceans

Several species of crustaceans are commonly found in the region's coastal waters, including blue crab (*Callinectes sapidus*), lady crab (*Ovalipes ocellatus*), rock crab (*Cancer irroratus*), and American lobster (*Homarus americanus*).

During the late fall and winter, blue crabs become dormant and bury themselves in the sediments of the deeper portions of Raritan and Lower New York Bays, and are harvested using dredges (MacKenzie, 1990). This harvest generally takes place between December 1 and April 30. Blue crab dredging grounds generally extend from the Raritan River to the mouth of the New York-New Jersey Harbor estuary in deeper areas such as the navigation channels and borrow pits (MacKenzie, 1990). Crab harvesting by dredge (for all species) is currently prohibited in Richmond County, New York (New York Environmental Conservation Law §13-0331). As such, the blue crab dredging grounds are primarily expected to overlap with the Raritan Bay Loop in the vicinity of the Ambrose Channel.

The New York-New Jersey Harbor once hosted an active fishery for American lobster (Tanski et al., 2014). Historical harvesting grounds within the region included the edges of the Ambrose, Sandy Hook, Chapel Hill, and Perth Amboy Channels, and the deep holes west of Chapel Hill Channel (Figley, 1988). Coastal populations of American lobster generally prefer habitats with available shelter such as rocks, debris, etc., though they can also be found burrowed in mud substrates.

Horseshoe Crabs

Horseshoe crabs (*Limulus polyphemus*) are also found in the Project area. Horseshoe crabs are an ecologically, economically, and medically important species on the east coast of the United States. They are harvested for use as bait in commercial American eel and conch fisheries, and for their blood, which is used in the biomedical industry (Atlantic States Marine Fisheries Commission [ASMFC], 2017). Horseshoe crab eggs and larvae are an important food source for migratory birds (e.g., red knot, dunlins, sanderlings, ruddy turnstones), other crab species, and several gastropods. In addition, horseshoe crabs are common prey for the sea turtles and finfish known to use the area, including striped bass, white perch, American eel, killifish, silver perch, weakfish, Atlantic silverside, summer flounder, and winter flounder (Antonucci et al., 2014).

Horseshoe crab can be seen mating along the sandy shorelines of the New York–New Jersey Harbor Estuary during the full moon in May or June (Antonucci et al., 2014). Females deposit a cluster of eggs in the sand near the high water line on the beach. The eggs hatch within 2 to 4 weeks and about a month later during a high tide, the larvae emerge from the beach and enter the water (FWS, 2006a). Larvae can be found in the water column July through September (Tanski et al., 2014). For the first few years of their life, juvenile horseshoe crab inhabit tidal flats and nearshore areas and move farther from shore as they get older (ASMFC, 2017a; FWS, 2006a). Adults migrate to deep bay waters and offshore for wintering (ASMFC, 2017a; FWS, 2006a).

The population of horseshoe crabs, once abundant in Raritan Bay and the New York-New Jersey Harbor, has declined substantially in recent decades. The most recent stock assessment report for horseshoe crab concluded that, since the ASMFC's initial horseshoe crab stock assessment in 1998, declining abundance in the New York region is evident, and the trend has not reversed (ASMFC, 2013a). The Bayshore Regional Watershed Council (BRWC) has conducted monitoring and tagging of horseshoe crab spawning populations at five estuarine sites in Sandy Hook Bay and Raritan Bay in Monmouth County since 2009 (BRWC, 2017). BRWC's 2017 end-of-year survey report indicates that the total horseshoe crab population within its study area is currently approximately 2,077 horseshoe crabs, compared to a low of 828 in 2015 and a high of 2,913 in 2013 (Reynolds, 2017). In the 9 years of monitoring conducted by BRWC, there has been no sign of sustained recovery, and the population remains at about 25 percent of its carrying capacity (Reynolds, 2017). Based on trawl surveys conducted in the fall of 2005 and 2006 seaward of the Rockaway Peninsula, horseshoe crab catch-per-unit-effort was estimated to range from 11 to 500 kilograms per kilometer (Graham, 2007). Assuming an average weight per individual of 1.4 kilograms (Graham, 2007), this equates to approximately 8 to 357 horseshoe crabs per kilometer (13 to 575 horseshoe crabs per mile). The ASMFC is in the process of preparing an updated horseshoe crab stock assessment, which is expected to be released in the spring of 2019.

The NYSDEC implements a horseshoe crab quota distribution plan to regulate the amount of commercial horseshoe crab harvest throughout the year. New York's commercial quota for horseshoe crabs for the 2018 fishing season was 150,000 crabs, the same annual allowance that the state has implemented since 2009 (NYSDEC, 2017a). In New Jersey, a moratorium is currently in place on the harvest of horseshoe crabs and horseshoe crab eggs (NJDEP, 2016b).

Fishery Resources of Special Concern

Fisheries resources of special concern occurring within the Project area include: 1) federally designated EFH; 2) species listed as federally or state threatened, endangered, or candidates and their designated or proposed critical habitat; and 3) species listed as species of concern by the NMFS. EFH within the Project area is discussed in section 4.5.3, and threatened and endangered species and their critical habitat are discussed in section 4.6. The NMFS species of concern are discussed below.

Species of concern are defined as those species with insufficient information to require listing under the ESA, but the NMFS has concerns regarding status and threats of the species. These species are not protected under the ESA; the designated status is in place to draw attention and conservation actions to the species.

Eight species of concern may occur in the offshore Project area: alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), rainbow smelt (*Osmerus mordax*), warsaw grouper (*Epinephelus nigritus*), cusk (*Brosme brosme*), Atlantic bluefin tuna (*Thunnus thynnus*), dusky shark (*Carcharhinus obscurus*), and sand tiger shark (*Carcharias taurus*). Three of these species, Atlantic bluefin tuna, dusky shark, and sand tiger shark, have designated EFH within or in the vicinity of the Project area. Cusk is listed as a candidate species for listing under the ESA, and is discussed in section 4.6 (see table 4.6.3-1).

4.5.2.5 Marine Mammals

Sixteen species of marine mammals may use the offshore Project area during the year, consisting of 13 species of cetaceans (i.e., whales, dolphins, and porpoises), and 3 species of pinnipeds (i.e., seals). Of these species, six are federally or state-listed as threatened or endangered; these species are discussed in section 4.6. The remaining non-listed marine mammal species are listed in table 4.5.2-2, along with a summary of their habitat preferences or distribution, seasonal occurrence in the Project area, likelihood of occurrence in the Project area, and available records of strandings in the vicinity of the Project area.

Seal haul-out sites are known to occur along shorelines in the vicinity of the Project area, including Swinburne Island and Hoffman Island in Lower New York Bay and Sandy Hook, New Jersey (Plagianos, 2015; NPS, 2017). These sites are located approximately 6.0 miles (9.7 kilometers), 6.7 miles (10.8 kilometers), and 1.8 miles (2.8 kilometers), respectively, from the Ambrose Channel HDD site.

All marine mammals are federally protected under the MMPA, which prohibits the taking of these species except under certain circumstances. The MMPA includes an incidental take program that provides a process for the taking of small numbers of marine mammals provided that the taking has a negligible impact. The most recent amendment to the MMPA in 1994 established an expedited process by which parties can apply for an authorization, referred to as an Incidental Harassment Authorization (IHA), to incidentally take small numbers of marine mammals by harassment. Harassment in the MMPA is defined as:

- Level A – any act that has the potential to injure a marine mammal; and
- Level B – any act that has the potential to disturb a marine mammal by causing disruption of behavioral patterns, such as migration, breathing, nursing, breeding, feeding, or sheltering.

TABLE 4.5.2-2

Non-Listed Marine Mammal Species Potentially Occurring in the Northeast Supply Enhancement Project Area

Common Name/ Scientific Name	Habitat\Distribution	Seasonal Occurrence in Region	Likelihood of Occurrence in Project Area	Recorded Strandings in the Vicinity of the Project Area
Cetaceans				
Atlantic white-sided dolphin *Lagenorhynchus acutus*	Inhabit temperate continental shelf and slope waters of the North Atlantic Ocean, moving closer inshore and north in the summer and offshore and south in the winter. [a(1)]	Year-round [a(3)]	Rare	9 strandings in NY and 3 strandings in NJ between 2009 and 2013. [a(3), b]
Bottlenose dolphin *Tursiops truncatus*	Found globally in temperate and tropical waters, including coastal populations that migrate into bays, estuaries, and river mouths, and offshore populations that inhabit pelagic waters along the continental shelf. [a(1)] The Western North Atlantic Northern Migratory Coastal Stock inhabits waters less than 66 feet (20 meters) deep from Long Island, NY to FL. [a(3)]	Summer [a(3)]	Possible	51 strandings in NY and 220 strandings in NJ between 2009 and 2013. [a(3), b, c]
Harbor porpoise [d] *Phocoena phocoena*	In the North Atlantic, species ranges from West Greenland to Cape Hatteras, NC and are commonly found in bays, estuaries, harbors, and fjords less than 650 feet (200 meters) deep. [a(1)]	October – June [a(3)]	Possible	39 strandings in NY and 22 strandings in NJ between 2009 and 2013. [a(3), b]
Long-finned pilot whale *Globicephala melas melas*	Species prefers deep pelagic temperate to subpolar oceanic waters, but have been known to occur in coastal waters. [a(1)] In U.S. Atlantic waters, species is principally found along the continental shelf edge, Georges Bank, and the Gulf of Maine. [a(3)]	Winter – Spring [a(3)]	Rare	5 strandings in NY and 2 strandings in NJ between 2009 and 2013. [a(3), b]
Minke whale *Balaenoptera acutorostrata*	Occur in polar, temperate, and tropical waters in most seas worldwide, both in coastal/inshore and offshore areas. [a(1)]	Spring – Fall [a(3)]	Possible	3 mortality or serious injury events near the Project area between 2009 and 2013. [a(3)]
Short-beaked common dolphin *Delphinus delphis*	Found worldwide in temperate and subtropical seas, primarily over the continental shelf in waters 328-6,500 feet (100-2,000 meters) deep. [a(3)]	January – May [a(3)]	Rare	70 strandings in NY and 62 strandings in NJ between 2009 and 2013. [a(3), b]
Short-finned pilot whale *Globicephala macrorhynchus*	Species can be found at varying distances from shore, but primarily inhabits deep waters in warmer tropical and temperate seas. [a(1)]	Seasonal distribution is not well known [a(3)]	Rare	No strandings in NY and 2 strandings in NJ between 2009 and 2013. [a(3), b]
Pinnipeds				
Gray seal *Halichoerus grypus*	Species is generally found in coastal waters. Haul-out habitats include rocky coasts and islands, sandbars, ice shelves, and icebergs. [a(1)]	September – May [a(3)]	Possible	71 strandings in NY and 29 strandings in NJ between 2009 and 2013. [a(3), b]
Harbor seal *Phoca vitulina*	In the Western North Atlantic, species is mainly found from the Canadian Arctic to New York in nearshore coastal waters. Haul-out habitats include rocks, reef, beach, and drifting glacial ice. [a(1)]	September – May [a(3)]	Possible	71 strandings in NY and 53 strandings in NJ between 2009 and 2013. [a(3), b]
Harp seal *Pagophilus groenlandicus*	Occur in pack ice throughout much of the North Atlantic and Arctic Oceans. In recent decades, strandings have increased along the U.S. east coast from Maine to New Jersey during the species' southern migration. Recent sightings have occurred in the vicinity of the Project area. [a(1,4)]	January – May [a(2)]	Possible	59 strandings in NY and 45 strandings in NJ between 2007 and 2011. [a(2), b]

[a] Sources: (1) NMFS, 2017p; (2) Waring et al., 2014; (3) Waring et al., 2016; (4) Gardiner and Honan, 2014.
[b] Totals are based on reporting at the state level, and likely include strandings that occurred well outside of the Project area.
[c] The bottlenose dolphin stranding reports for 2013 were much higher than previous years due to an Unusual Mortality Event caused by a virus.
[d] The harbor porpoise is listed as Species of Special Concern in New York.

The NMFS has the authority to enforce the MMPA and issue IHAs. Transco is consulting with the NMFS and has submitted a draft application for an IHA for Level B harassment of 10 marine mammal species that could be present in the vicinity of the Raritan Bay Loop during construction: gray seal, harbor seal, harp seal, bottlenose dolphin, harbor porpoise, short-beaked common dolphin, fin whale, North Atlantic right whale, humpback whale, and minke whale. Details of the IHA request are discussed further in section 4.5.2.8.

4.5.2.6 Sea Turtles

Five species of sea turtles have the potential to occur within Project area. These include the green, Kemp's ridley, leatherback, loggerhead, and hawksbill sea turtles. Sea turtles occurring in the Project area are protected under the ESA and are discussed in section 4.6.

4.5.2.7 Avian Species

Many of the potential impacts on offshore avian species would be similar to those discussed for onshore birds and their habitats in section 4.5.3.2 and the federally listed shore birds discussed in section 4.6.2.2.

As discussed in section 4.5.2.4, the Raritan Bay Loop would also cross the FWS-designated Raritan Bay-Sandy Hook Bay Significant Habitat Complex, a complex significant because of its geographic location and to the variety and quality of its habitat types, which support a number of regionally rare and important migratory shorebird and waterfowl species (FWS, 1997). This complex includes the Raritan Bay and Southern Shore IBA. This IBA is discussed further in section 4.5.3.2.

4.5.2.8 General Impacts and Mitigation

Seafloor Disturbance

Construction of the pipeline would directly disturb approximately 87.8 acres of ocean floor (see section 2.2.1.2). This estimate includes direct impacts on the seafloor from mechanical activities (e.g., pipeline installation), vessel mooring systems/anchor placement, temporary piles, and entry/exit excavations for HDD operations. In total, an estimated 1,091,734 cubic yards of sediment would be excavated or otherwise disturbed during the offshore pipeline installation, including HDD pit excavations, jet trenching, clamshell dredging, and hand jetting. Based on Project-specific sediment transport modeling (discussed below), about 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediments disturbed by the offshore construction activities. The majority of the seafloor disturbance would be associated with the proposed offshore excavations. These would include dredging and trenching activities involving the use of a clamshell dredge, jet trencher, hand-jetting equipment, and mass flow excavator (submersible suction pump). Vessel mooring, anchor placement, and anchor cable sweep would also disturb small, isolated areas of substrate and impact the benthic community in these locations. Project-related construction vessels would be moored by using anchors, spuds, lift legs, or by tethering to other moored vessels. To reduce the amount of anchor cable contact with the seafloor during construction, Transco has proposed to use mid-line buoys to the extent practicable. Of the total 87.8 acres of seafloor disturbance, approximately 0.2 and 0.9 acre of seafloor would be disturbed from anchor cable sweep in New Jersey and New York state waters, respectively. Typical anchor spreads for large construction vessels are illustrated in figure 2.3.3-2.

Following construction, Transco would restore disturbed areas to the ambient contours of the surrounding seafloor (see section 2.3.3.9 for a detailed description of backfilling operations). Areas to be installed using the jet trencher are not expected to require backfilling, as Transco estimates that at least 95 percent of the disturbed material would remain within the trench during pipeline lowering. In other areas, supplemental backfill would be added as needed using a clamshell dredge fitted with an environmental bucket. During supplemental backfilling activities, the clamshell bucket would be lowered below the water surface before release to help reduce loss of backfill and minimize turbidity. In response to NYSDEC comments, Transco concluded that use of a tremie line would result in greater turbidity and sedimentation than would the proposed use of an environmental clamshell, which would result in only an estimated 0.5 percent sediment loss when conducted in conjunction with no scow overflow. As discussed in section 2.3.3.10, Transco plans to purchase supplemental backfill material from a vendor that has been permitted by the USACE to dredge sandy sediment from the Ambrose Channel in New Jersey waters seaward of the proposed Raritan Bay Loop crossing location. Transco estimates that 1,108,928 cubic yards of supplemental backfill material would be needed based on the total volume of all areas requiring backfill plus additional volume to account for losses during dredging and material that may be dispersed or off-target during backfill placement. Following completion of backfilling operations, Transco would conduct a hydrographic survey to verify that the contours of the seafloor have been restored, and would backfill as needed, in accordance with permit conditions. Transco anticipates that the hydrographic survey would be conducted within 30 days following the completion of all backfilling activities for the Raritan Bay Loop. Transco would also conduct an annual post-construction monitoring survey to ensure that adequate burial depth is maintained along the pipeline route.

The use of offshore construction equipment and the proposed construction methods could have both direct and indirect impacts on offshore resources. Direct impacts would include mortality, injury, or temporary displacement of the organisms living on, in, or near the seafloor. Indirect impacts would include suspension of sediments in the water column, which could clog fish gills and obscure visual stimuli, and the redistribution of sediments that fall out of suspension, which could bury benthic and demersal species, resulting in mortality of eggs and other life stages. Benthic invertebrates and demersal (bottom-dwelling) fish species in or near the excavation area would be most affected. Pelagic fish, sea turtles, and marine mammals could also be affected and would likely temporarily vacate the area to avoid the disturbance.

Transco conducted hydrodynamic and sediment transport modeling to assess the potential effects of offshore excavation on turbidity and the redistribution of sediments. Transco also conducted additional sediment transport modeling to evaluate backfill placement activities. Sediment sampling and sediment transport modeling reports prepared by Transco are summarized in table 4.5.2-3.

TABLE 4.5.2-3

Summary of Sediment Sampling and Modeling Reports

Report Type	Date Filed	Accession No.	Summary
Sampling			
Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement Project	6/30/2017	20170630-5374; Attachment 4	Describes the methodologies, locations, and results of sampling to characterize water quality, physical and chemical characteristics of sediments, and benthic communities at 69 locations along the planned Raritan Bay Loop and 18 locations along a potential route alternative suggested by the NYSDEC.
Errata to Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement	9/7/2017	20170907-5156; Attachment 6	Includes a small number of corrections to the original report.
Errata and Addendum to Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement	10/6/2017	20171006-5174; Attachment 5	Errata includes a small number of corrections to the original report. Addendum presented additional grain size analysis of samples obtained from 27 of the original 87 sampling locations and from 6 new sampling locations near the Long CP Power Cable Anode Sled.
Addendum to the Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement Project	11/2/2018	20181102-5201, Attachment 5	Describes the methodologies, locations, and results of sampling to address the geotechnical and chemical characteristics of sediment within the Raritan Bay Channel and Chapel Hill Chanel at depths deeper than what was sampled previously.
Turbidity and Sedimentation Modeling			
Hydrodynamic and Sediment Transport Modeling Results: Base Case Simulations	9/7/2017	20170907-5156; Attachment 8	Describes the development and calibration of a three-dimensional hydrodynamic model for the NESE Project area using the WQMAP/BFHYDRO modeling system and application of the SSFATE sediment transport model to predict turbidity and sedimentation resulting from 14 scenarios during pipeline trench and HDD pit excavation.
Hydrodynamic and Sediment Transport Modeling Results: Addendum 1	10/31/2017	20171031-5252; Attachment 5	Describes the predicted turbidity and sedimentation resulting from 11 scenarios of backfill placement.
Hydrodynamic and Sediment Transport Modeling Results: Addendum 2	5/11/2018	20180511-5170; Attachment 13	Describes the predicted turbidity and sedimentation resulting from 16 scenarios of excavation and backfilling variations involving the use of environmental clamshell buckets and scows with limited or no overflow allowed.
Supplemental Construction Alternative Analysis	8/7/2018	20180807-5139	Describes the predicted turbidity and sedimentation resulting from six scenarios of excavation and backfilling the Raritan Bay Loop to a depth of 15 feet across the Raritan Bay Channel, Chapel Hill Channel, and anchorage area 28.
Hydrodynamic and Sediment Transport Modeling Memo – Addendum 4	11/2/2018	20181102-5201, Attachment 6	Describes the predicted turbidity and sedimentation results from clamshell dredging and side-casting of dredged materials for the crossing of anchorage area 28.
Hydrodynamic and Sediment Transport Modeling Memo – Addendum 4 – Revision 1	11/30/2018	20181130-5337, Attachment 1	Describes the predicted turbidity and sedimentation results for clamshell dredging and side-casting of dredged materials for the crossing of anchorage area 28, as well as results for clamshell dredging and backfilling activities from MP 33.5 to 33.9.

Hydrodynamic modeling was performed using RPS Group Plc.'s (RPS) Water Quality Model and Analysis Package/Boundary-Fitted Hydrodynamics (WQMAP/BFHYDRO) modeling system to model the tides, currents, and circulation patterns within the offshore Project area. Sediment transport modeling was performed using RPS' Suspended Sediment Fate (SSFATE) model, which is a three-dimensional model developed jointly by the USACE and the Environmental Research Development Center. SSFATE is a well-known model that has been successfully applied in projects around the globe (including previous studies in the New York/New Jersey region) to simulate the sediment transport from dredging, cable and pipeline burial operations, sediment dumping, dewatering operations, and other sediment-disturbing activities. SSFATE computes TSS concentrations released into the water column and predicts the transport, dispersion, and settling of the suspended sediment. Several model simulations were run to evaluate the concentrations of suspended sediments, spatial extent and duration of sediment plumes, and the seafloor deposition resulting from each of the sediment-disturbing construction activities proposed for the Project. The grain size distributions used for modeling were based on vibracore samples collected along the proposed pipeline route during Transco's 2016/2017 survey, which indicate the sediments are primarily composed of sand, silt, and clay. The sediment transport modeling results are summarized in the following tables. Table 4.5.2-4 summarizes the results for excavation activities, and table 4.5.2-5 summarizes the results for backfilling placement activities.

The sediment plumes and TSS concentrations predicted by the sediment transport modeling varied with the type of excavation activity and the location along the proposed route. The modeling results indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend up to 3,150 feet from the source for clamshell dredging activities, with the largest extent occurring between MPs 24.0 and 24.8. The model estimated that TSS concentrations would be expected to return to ambient conditions within less than 1 hour to 1.9 hours following the cessation of dredging activities. Modeling results for the jet trencher indicated that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 262 feet to 1,345 feet from the source, with TSS concentrations returning to ambient conditions within 1.4 to 7.9 hours. For the hand jet and submersible pump, the results indicated that sediment plumes would extend between 197 feet to 1,378 feet from the source, and would abate within 0.7 to 3.4 hours.

The predicted sediment plumes and TSS concentrations for backfilling activities also varied along the offshore route. For backfill placement activities, sediment modeling results indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 591 and 5,151 feet from the source, and TSS concentrations would return to ambient conditions within 0.4 to 3.5 hours.

The modeling results are generally consistent with dredge plume dynamics observed during activities associated with the New York and New Jersey Harbor Deepening Project. Between June 2006 and February 2014, the USACE conducted 15 water quality/TSS surveys as part of this program (USACE, 2015). Monitoring indicated that TSS concentrations decayed rapidly with distance down-current from the dredge, dissipating to background conditions within approximately 656 feet in the upper water column and 1,967 feet in the lower water column, even when sediments were predominantly silt and clay (50 percent to 95 percent). At the bottom, plume signatures rarely extended beyond 2,625 feet. Numerical modeling for the Rockaway Delivery Lateral Project predicted that sediment plumes generated seaward of the Rockaway Peninsula would disperse within 5 hours of excavation. Water quality monitoring conducted during construction of the Rockaway Delivery Lateral Project indicated that the modeling results were generally overestimated.

TABLE 4.5.2-4

Summary of Sediment Transport Modeling Results for Excavation of the Raritan Bay Loop

Construction Activity	Equipment Type	Location	Time for TSS to Return to Ambient (hours)	Max Distance of TSS Plume (feet)		Max Distance of Sediment Deposition (feet)			Area of Sediment Deposition (acres)		
				>50 mg/L Above Ambient	>100 mg/L Above Ambient	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)
Excavation of Morgan Shore Approach HDD Exit Pit and Long CP Cable HDD Exit Pit/Anode Sled Burial Area	Clamshell Dredge (with envir. bucket)	MP 12.50 and ~1,200 ft north of MP 12.3	0.4	328	148	102	0	0	0.5	0.0	0.0
Pre-lay Trenching Between Morgan Shore Approach HDD Exit Pit and Midline Tie-in	Clamshell Dredge (with envir. bucket)	MP 12.5 to 16.6	0.4	262	0	0	0	0	0.0	0.0	0.0
Jetting at Neptune Cable Crossing	Hand Jet	MP 13.9	3.4	2,592	1,378	958	413	236	10.7	3.9	1.1
Post-lay Trenching between Midline Tie-in and Raritan Channel Transition – 2 Passes	Jet Trencher	MP 16.6 to 17.2	6.9	1,591	1,001	36	0	0	0.1	0.0	0.0
Pre-lay Trenching Across Raritan Channel	Clamshell Dredge (with envir. bucket)	MP 17.2 to 18.0	0.0	131	0	0	0	0	0.0	0.0	0.0
Post-lay Trenching Between Curve 1 and Anchorage Area – 2 Passes	Jet Trencher	MP 18.0 to 24.0	7.9	1,329	853	99	0	0	69.3	0.0	0.0
Side-cast Across Anchorage Area 28	Clamshell Dredge	MP 24.0 to 24.8	1.3	4,167	3,150	407	240	180	50.9	32.2	21.7
Pre-lay Trenching Across Chapel Hill Channel	Clamshell Dredge (with envir. bucket)	MP 24.8 to 25.6	0.3	131	0	82	0	0	11.9	0.0	0.0
Post-lay Trenching Between Curve 4 and Ambrose Channel – 2 Passes	Jet Trencher	MP 25.6 to 29.5	1.4	410	262	79	0	0	52.1	0.0	0.0
Excavation of Ambrose Channel HDD Pit (West)	Clamshell Dredge (with envir. bucket)	MP 29.5	1.1	443	0	371	253	0	3.6	1.2	0.0
Excavation of Ambrose Channel HDD Pit (East) and Ambrose Channel Tie-in	Clamshell Dredge (with envir. bucket)	MP 30.4	0.0	0	0	295	243	187	3.8	2.7	1.4
Post-lay Trenching Between Ambrose Channel and Neptune Cable Crossing – 2 Passes	Jet Trencher	MP 30.4 to 33.5 and MP 33.9 to 35.2 [a]	5.7	2,346	1,345	66	0	0	10.9	0.0	0.0
Excavation Between Ambrose Channel and Neptune Cable Crossing	Clamshell Dredge (with envir. bucket)	MP 33.5 to 33.9	0.3	131	0	0	0	0	0.0	0.0	0.0

TABLE 4.5.2-4 (cont'd)

Summary of Sediment Transport Modeling Results for Excavation of the Raritan Bay Loop

				Max Distance of TSS Plume (feet)		Max Distance of Sediment Deposition (feet)			Area of Sediment Deposition (acres)		
Construction Activity	Equipment Type	Location	Time for TSS to Return to Ambient (hours)	>50 mg/L Above Ambient	>100 mg/L Above Ambient	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)
Jetting at Neptune Cable Crossing Offshore Rockaway	Hand Jet	MP 35.2	0.7	591	197	548	394	171	5.4	2.9	1.2
Side-cast Between Neptune Cable Crossing and the Rockaway Transfer Point	Clamshell Dredge	MP 35.2 to 35.5	1.9	1,690	1,296	436	348	249	22.7	14.9	9.9
Tie-in Skid and Manifold Excavation at Rockaway Transfer Point (75 percent Submersible Pump, 25 percent Hand Jet)	Submersible Pump/Hand Jet	MP 35.5	0.7	787	722	591	456	328	9.8	6.3	3.7
Total Predicted Sedimentation Impacts (acres)									251.7	64.1	39.0

[a] Modeling results in this row are for jet trenching of the entire area between MPs 30.4 and 35.2, though MPs 33.5 to 33.9 would be installed via clamshell dredge with an environmental bucket. Thus, these results are likely to be overestimated.

TABLE 4.5.2-5

Summary of Sediment Transport Modeling Results for Backfill of the Raritan Bay Loop

Backfilling Activity	Equipment Type	Location	Time for TSS to Return to Ambient (hours)	Max Distance of TSS Plume (feet)		Max Distance of Sediment Deposition (feet)			Area of Sediment Deposition (acres)		
				>50 mg/L Above Ambient	>100 mg/L Above Ambient	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)	>0.12 in (0.3 cm)	>0.4 in (1.0 cm)	>1.2 in (3.0 cm)
Backfilling of Morgan Shore Approach HDD Exit Pit and Long CP Cable HDD Exit Pit/ Anode Sled Burial Area	Clamshell Dredge	MP 12.5 and 1,200 north of MP 12.3	2.0	1,362	886	404	305	253	9.4	6.6	4.8
Backfilling of Trench Between Morgan Shore Approach HDD Exit Pit and the Midline tie-in	Clamshell Dredge	MP 12.5 to 16.6	1.1	1,460	591	525	420	266	314.6	250.3	183.2
Backfilling of Neptune Cable Crossing	Clamshell Dredge	MP 13.9	3.5	1,903	1,247	427	371	197	4.4	2.9	1.6
Backfilling of Trench Across Raritan Channel	Clamshell Dredge	MP 17.2 to 18.0	1.1	1,575	853	817	653	574	105.6	76.8	61.5
Backfilling of Trench Across Anchorage Area	Clamshell Dredge	MP 24.0 to 24.8	1.0	1,755	1,247	371	318	253	55.3	43.4	33.5
Backfilling of Trench Across Chapel Hill Channel	Clamshell Dredge	MP 24.8 to 25.6	1.8	2,493	1,247	787	577	522	96.8	70.7	56.1
Backfilling of Ambrose Channel HDD Pit (West)	Clamshell Dredge	MP 29.5	1.3	1,788	1,526	948	755	499	15.1	8.9	5.1
Backfilling of Ambrose Channel HDD Pit (East) and Tie-in	Clamshell Dredge	MP 30.4	0.4	5,299	5,151	945	774	456	19.7	13.4	9.5
Backfilling Between Ambrose Channel and Neptune Cable Crossing	Clamshell Dredge	MP 33.5 to 33.9	1.4	1,312	787	427	335	262	28.4	21.8	15.6
Backfilling at Neptune Cable Crossing	Clamshell Dredge	MP 35.2	2.1	2,182	1,476	489	443	377	7.6	4.9	3.0
Backfilling of Trench Between Neptune Cable Crossing Tie-in Skid	Clamshell Dredge	MP 35.2 to 35.5	2.3	2,493	1,493	633	531	335	26.8	19.6	12.0
Backfilling at Tie-in Skid and Manifold at Rockaway Transfer Point	Clamshell Dredge	MP 35.5	3.0	2,395	1,739	709	607	476	12.0	9.0	5.4
				Total Predicted Sedimentation Impacts (acres)					695.7	528.3	391.3

Transco would monitor turbidity during construction and would adjust construction activities to the extent practicable to reduce excessive turbidity. Transco would employ best management practices to reduce sediment plumes from Project construction and would be required to adhere to New York and New Jersey state water quality standards. The NYSDEC has indicated that monitoring of the water column for chemical contaminants, as well as turbidity, would be required in New York State to ensure compliance with state water quality standards. Transco is consulting with the NYSDEC to determine specific requirements and the extent of such monitoring, and Transco would comply with monitoring requirements set forth in the NYSDEC Water Quality Certification.

The sediment transport modeling was also used to predict the amount of sedimentation that may occur as the suspended sediments are redeposited down-current of the excavation and backfilling activities (see tables 4.5.2-4 and 4.5.2-5). The modeling results indicate that sedimentation from clamshell dredging during excavation may exceed 1.2 inches (3 centimeters) of deposition up to 249 feet from the source and would cover between 0 and 21.7 acres. Sedimentation exceeding 1.2 inches (3 centimeters) is not expected in areas where the jet trencher would be utilized. For the hand jet and submersible pump/suction dredge, modeling results indicated that the sedimentation exceeding 1.2 inches (3 centimeters) would extend between 171 to 328 feet from the source and would cover between 1.1 and 3.7 acres. The sediment modeling results indicate that sedimentation greater than 1.2 inches (3 centimeters) resulting from backfill placement would range between 197 and 574 feet from the source and would cover between 1.6 and 183.2 acres.

As indicted in tables 4.5.2-4 and 4.5.2-5, thinner deposits of sediments would extend further from areas of seafloor disturbance. Figures 4.5.2-2 and 4.5.2-3 depict the extent of at least 0.12 inch (0.3 centimeter) of sedimentation from excavation and backfill activities, respectively.

Table 4.5.2-6 summarizes the area of various offshore resources that would be impacted by differing thickness of sedimentation from excavation and backfilling activities, and the impact of Project-related turbidity and sedimentation on marine resources is discussed below.

TABLE 4.5.2-6

Summary of Sedimentation Impacts for the Northeast Supply Enhancement Project

	Total Acres of Resource Area Affected [a]									
Sediment Deposition (minimum average)	NJ Shellfish Waters		NJDEP 2014 Surfclam Beds	NJDEP 2014 Hard Clam Beds	NJDEP Sport Ocean Fishing Grounds	NY Shellfish Lands		NYSDEC Special Harvest Areas		Shallow Waters (<20 ft MLLW) [b]
	Prohibited	Special Restricted				Uncertified	Certified	Transplan-tation (Hard Clam)	Bait (Surfclam)	
0.12 in (0.3 cm)	197.7	0.0	0.0	134.6	26.6	520.9	38.9	282.8	28.6	573.3
0.4 in (1 cm)	123.5	0.0	0.0	104.9	13.5	330.0	29.4	209.2	21.9	372.8
1.2 in (3 cm)	88.5	0.0	0.0	76.0	9.5	250.6	19.7	157.6	15.6	279.5

[a] Totals are based on sums of the estimated impact acreage for each individual construction activity/location. In locations where the same area of seafloor is affected by sediment deposition from more than one construction activity, the acreage total is cumulative. In the event that more than one construction activity affects the same area concurrently, total acreage affected would be overestimated.

[b] Shallow estuarine waters in the Project area may serve as spawning habitat for winter flounder.

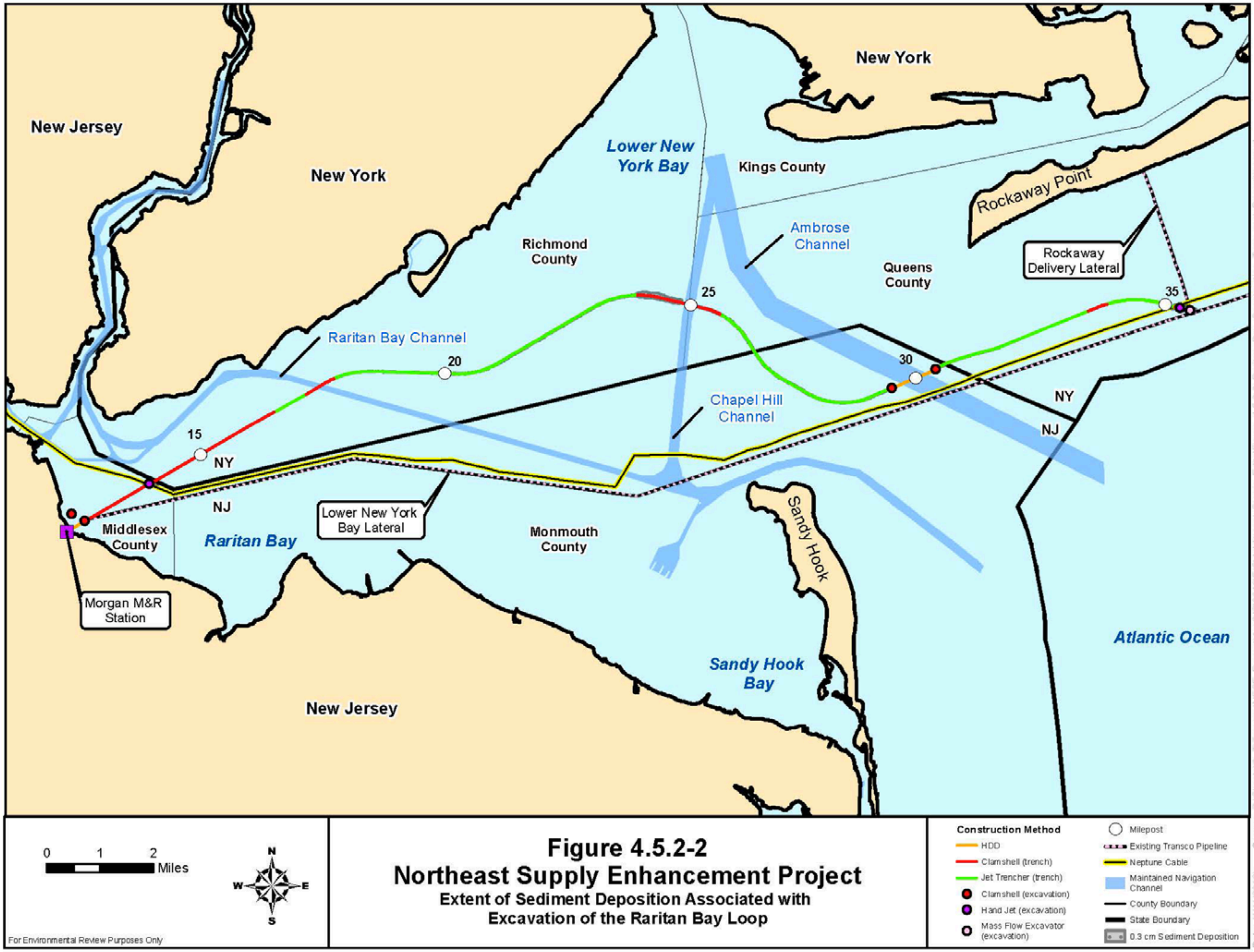

Figure 4.5.2-2
Northeast Supply Enhancement Project
Extent of Sediment Deposition Associated with Excavation of the Raritan Bay Loop

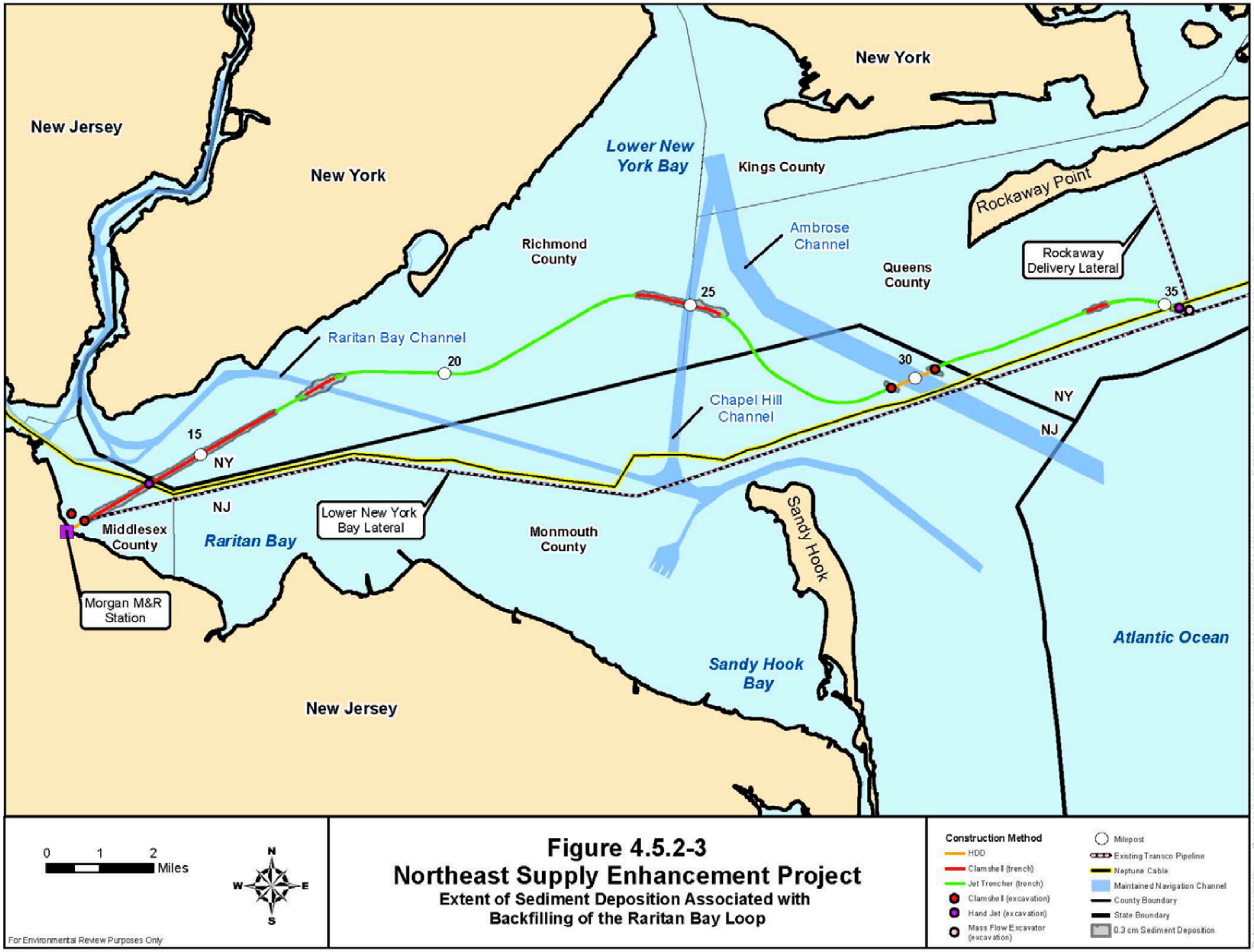

Figure 4.5.2-3
Northeast Supply Enhancement Project
Extent of Sediment Deposition Associated with Backfilling of the Raritan Bay Loop

The Rockaway Reef, an artificial reef managed by the NYSDEC Marine Artificial Reef Program, is approximately 1 mile northeast of the Rockaway Transfer Point at MP 35.5. Modeling results indicate that TSS concentrations of 50 mg/L above ambient concentrations from excavation and backfilling would not extend more than 0.5 mile from the Rockaway Transfer Point and that sedimentation in excess of 0.12 inch (0.3 centimeter) would not extend more than 709 feet from seafloor disturbing activities at the Rockaway Transfer Point. Based on these results, the Rockaway Reef and associated biota would not be expected to experience adverse impacts from construction-related turbidity or sedimentation.

Suspended sediments and turbidity can elicit short- and long-term responses from aquatic biota depending on interactions between dynamic and complex factors such as sediment quality, grain size, water temperature, duration and frequency of exposure, species life stage and life history, season, physical condition of biota, and refugia/habitat availability. In general, benthic species are more tolerant of suspended sediments than pelagic species (Kjelland et al., 2015). However, mobile species would likely temporarily vacate turbid areas that cause them discomfort or stress. The model-predicted turbidity and sedimentation impacts associated with construction of the Project must also be considered in context of other natural and anthropogenic sources of suspended sediment in the region. The busy New York/New Jersey Harbor is exposed to ongoing sources of sediment resuspension, such as the periodic passage of storms, the occurrence of freshets and high riverine discharges, fishing activities, and sediment disturbance by deep-draft vessel traffic (USACE, 2015). Thus, species inhabiting the region are likely accustomed to some degree of turbidity and sedimentation. Literature suggests that hard clams can tolerate a wide range of TSS levels, with impacts being dependent on the duration of exposure (e.g., Davis and Hidu, 1969; Murphy, 1985; Huntington and Miller, 1989; Turner and Miller, 1991). In a review by Berry et al. (2003), hard clam adults were found to experience reduced growth after 2 days of exposure to suspended sediment concentrations of 100 mg/L. Hard clam larvae experienced 10 percent mortality after 10 days of exposure to suspended sediment concentrations of 750 mg/L. Also, hard clams are thought to be able to tolerate burial with less than 15 centimeters of sediment (Maurer et al., 1986; Krantz, 1974). For Atlantic surf clams, studies indicate that a 3-day exposure of 100 to 1,000 mg/L TSS had no effect on growth (Robinson et al., 1984). Surf clam adults were found to experience reduced growth after 21 days of exposure to 500 mg/L (Berry et al., 2003). Additionally, Atlantic surf clams are a burrowing bivalve that would likely be able to reposition themselves within the sediment following a minor burial event. Adverse effects were observed for egg and larval life stages of non-salmonid fish species known to occur in the Project region at sediment concentrations of 100 to 1,000 mg/L for 24 to 168 hours of exposure. Suspended sediment concentrations causing 50 percent mortality in adult non-salmonid fish species ranged from 247 to 8,800 mg/L at 24 hours of exposure. It is possible that the increased sediment load from Project construction activities would result in the mortality of some clams and other benthic organisms. However, TSS concentrations and sedimentation predicted for the Project are generally below the levels and durations that would be expected to adversely affect clams and other benthic organisms. Given the relatively short duration of dredging and backfilling activities, and the rapid pace at which resuspended sediments are expected to settle out of the water column, impacts of sedimentation and turbidity on aquatic resources are anticipated to be temporary and minor.

We received comments on the draft EIS regarding the potential for Project-related disturbances to increase the spread of the QPX parasite in hard clams. QPX is not a threat to humans, but can cause mortality events in wild and cultured clams. QPX is a single-celled parasite that has been associated with large die-offs of hard clams in the Northeast and Mid-Atlantic since the first known mortality event in New Brunswick in 1959. In the summer of 2002, a large mortality event was detected in Raritan Bay off the coast of Staten Island, leading to the suspension of the hard clam transplant fishery until 2005 (New York Sea Grant, 2003; Liu et al., 2017). Monitoring of Raritan Bay hard clams following the 2002 mortality event found that QPX prevalence was generally below 10 percent (Allam and Pawagi, 2005). The transmission of QPX is not well understood, but it has been suggested that QPX is routinely present in the sediment and ambient waters, and does not cause disease until there is environmental stressor or some other factor that makes the clams less resistant to infections (New York Sea Grant, 2003). Environmental factors such as salinity and temperature, as well as clam population density, appear to be important factors in the occurrence and severity of QPX infections (Liu et al., 2017; Liu et al., 2009). Temperature appears to be of particular importance, and studies suggest that QPX is a "cold water disease", as lower water temperatures are associated with greater disease prevalence and intensity (Liu et al., 2017; Wang et al., 2016). Research has also identified seasonal patterns of QPX disease in Raritan Bay (Liu et al., 2017). We were not able to identify any research or data that establish a relationship between anthropogenic disturbances such as dredging and the occurrence and transmission of QPX disease. Given that hard clams in the Project area are exposed to ongoing natural and anthropogenic sources of sediment resuspension (USACE, 2015), we conclude that the short-term disturbance associated with Project construction is not likely to result in a measurable increase in QPX occurrence, severity, or transmission.

Expected recovery times of benthic communities following disturbance are difficult to predict and depend on several factors, including the timing, severity, and frequency of the impact; the complexity and stability of the habitat; community composition; and the characteristics of the surrounding environment. When a soft-bottom benthic community (like those that would be affected by the Project) is physically disturbed by dredging or smothering, the community can generally be expected to recolonize through natural succession in approximately 1 to 3 years, based on the results of a number of studies on benthic recovery (e.g., AKRF, Inc. et al., 2012; Germano et al., 1994; Hirsch et al., 1978; Kenny and Rees, 1994; LaSalle et al., 1991; Murray and Saffert, 1999; Newell et al., 1998; and Rhoades et al., 1978). This estimate represents what we would expect in areas affected by excavation and backfilling as well as adjacent areas where redeposition of sediments would be thickest. Faster rates of recovery would likely occur in areas less affected by sedimentation. However, if the physical characteristics of the habitat are altered (e.g., sediment type, hydrology), resulting in recolonization of different species, benthic community recovery could take longer (Schaffner et al., 1996; Van Dolah et al., 1994; Wilber and Stern, 1992). We expect that affected benthic communities in the construction area would re-establish within a short time as native assemblages recolonize the affected area or a new community develops as a result of immigration of organisms from nearby areas or from larval settlement.

As discussed in section 4.5.2.2, we received comments on the draft EIS expressing concern that the Project could contribute to the occurrence and frequency of HABs in the region, as the disturbance of sediments could release nutrients conducive to HAB growth. In 2013, the USACE released the report of an 18-month study on the open water placement of dredge material in Lake Erie that involved field sampling, laboratory analysis, and lake eco-system modeling (Ecology and Environment and LimnoTech, 2014). This study concluded that release of dredged sediments into the water column and associated turbidity did not provide a sufficient source of bioavailable substances to stimulate the growth of HABs. While this study was conducted in a freshwater environment rather than a marine environment, to our knowledge, it is the most comprehensive study available of the potential relationship between dredged material and the development of HABs. Additionally, the disturbance of sediments and nutrients that would be associated with the Project would be negligible in comparison to the existing influx of pollutants and nutrients from the watersheds that feed into Raritan Bay and surrounding waters. Transco would use an environmental bucket during all clamshell dredging (unless the environmental bucket encounters refusal due to hardpan or bedrock) with no barge scow overflow in areas of elevated contaminants (e.g., NYSDEC Class C sediments) that are often associated with higher silt and organic content. Use of an environmental bucket would help to reduce the potential transport of sediments that may contain nutrients conducive to the growth of HABs. Implementation of Transco's Plan and Procedures would also minimize the transport of sediments and associated nutrients from onshore construction areas into nearby waterways. We conclude that the proposed Project construction activities are unlikely to increase the occurrence or frequency of HAB events.

Transco plans to install pre-formed concrete mattresses (or the equivalent) at the two locations where the Raritan Bay Loop would cross the Neptune cable. The mattresses would be placed in excavated areas on both sides of the cable, over which the pipeline would be laid. At cable crossings where minimum burial depth cannot be achieved, Transco would also install concrete mattresses over the top of the pipeline. The toe ends of the concrete mattresses would be buried to a minimum depth of 2.5 feet below the seafloor to prevent fishing gear from snagging on the mattresses. Transco expects to achieve at least 1 foot of sediment cover over the concrete mattresses, but concrete mattresses may be exposed. Transco estimates that the maximum total surface area of concrete mattresses that could be exposed/unburied at the two Neptune Cable crossings is approximately 7,840 square feet (0.2 acre) for the crossing at MP 13.9, and 2,350 square feet (0.05 acre) for the crossing at MP 35.2. Exposed concrete mattresses (or those with less than 1 foot of sediment cover) would result in a permanent change in the benthic community at those locations from a soft-bottom habitat to an artificial hard bottom substrate. Concrete is a commonly used material for artificial reef structures, and has a demonstrated high success rate as artificial reef substrate in both marine and estuarine environments (Atlantic and Gulf States Marine Fisheries Commissions, 2004). After a period of time, the concrete mattresses would likely be colonized by epifaunal taxa similar to those found on other hard bottoms in the region. In a 5-year experimental study of artificial reef colonization in New Jersey waters, Figley (2003) found that, in terms of mean total biomass, colonization was greatest on concrete substrate, followed by rock, rubber, and steel. A post-construction survey of concrete mattresses conducted for the Long Island Replacement Cable Project (ESS Group, Inc., 2011a) found that 2 years after construction, the benthic community consisted of relatively sedentary, mainly epifaunal taxa, such as gastropods, bivalves, tube-forming amphipods and polychaetes, skeleton shrimp, and barnacles, though some highly motile polychaetes and crustaceans were also present. Community composition varied, but benthic macroinvertebrate assemblages did not differ significantly in overall abundance or richness between the control and concrete mattress sampling sites.

Horseshoe crab in the Project area may be injured or killed by excavation activities and/or increased turbidity. Indirect effects could include the temporary loss of foraging habitat. Some of the proposed offshore construction activities would occur in sandy substrate areas as shallow as 7 feet mean lower low water. Juvenile, adult, and larval life stages of the horseshoe crab may be present in these areas and could be adversely affected by construction activities. The use of the HDD method for the Morgan shore crossing would avoid impacts on the intertidal zone of the New Jersey shoreline. Additionally, by avoiding the majority of the designated anchorage areas, the Raritan Bay Loop route would also avoid deeper areas of Raritan Bay and Lower New York Bay where wintering adult horseshoe crab may be found. The NJDEP recommended that no construction activities take place nearshore or offshore between April 15 and September 15 to avoid impacts on horseshoe crab. However, given the time of year restrictions for other sensitive species, May to September is the only feasible time period for Transco to construct the Raritan Bay Loop. As such, Transco has requested that construction activities be allowed near the Morgan shore during the recommended horseshoe crab time of year restriction (see table 4.5.2-7) and will continue to consult with the NJDEP about this request. Transco has not proposed species-specific mitigation measures for horseshoe crab, but potential impacts would be reduced by Transco's effort to minimize seafloor disturbance to the extent practicable, the implementation of best management practices during construction (e.g., use of an environmental bucket during all clamshell dredging), and backfilling with clean material where necessary. Transco will continue to consult with the NJDEP, NYSDEC, and the NMFS regarding additional feasible measures to reduce Project-related impacts on horseshoe crab.

Transco's consultation with the NMFS has identified winter flounder as a sensitive resource in the Project area. As discussed in more detail in section 4.5.3.2, winter flounder spawn in shallow, inshore waters and their demersal eggs and larvae could be directly affected by excavation activities or smothered by sediments disturbed during construction and backfilling. Transco plans to minimize potential impacts on winter flounder by avoiding sediment-disturbing activities during the December 15 to May 31 spawning season in areas of Raritan Bay and Lower New York Bay that are shallower than the 20-foot bathymetric contour (MPs 12.0 to 30.7). Transco would also implement a 500-foot buffer seaward of the 20-foot contour to minimize the potential impacts of sediment transport beyond the offshore workspace. The NYSDEC preliminarily indicated that the time of year restriction could start on January 1 instead of December 15 for backfilling activities. Transco will continue to consult with the NMFS and the NYSDEC regarding construction methods and time of year restrictions for winter flounder.

To minimize potential sensory impacts of construction on river herring (i.e., alewife and blueback herring) during their peak spawning migration, Transco would restrict dredging and pile driving activities from December 15 through May 31 between MPs 12.0 and 15.5. The NMFS has recommended a time of year restriction for river herring of March 1 to June 30, but Transco is requesting modification to this schedule (see table 4.5.2-7) and will continue to consult with NMFS about this potential change. The NMFS and the NYSDEC preliminarily indicated that they would allow a start date of June 1 for activities between MPs 12.5 and 15.3.

To minimize potential impacts on blue crab, construction of the Raritan Bay Loop would be restricted from December 1 through April 30 within a 500-foot buffer around the Ambrose Channel and the Chapel Hill Channel (excluding Richmond County, where dredge harvest of crabs is prohibited). Alternatively, the NYSDEC and the NMFS preliminarily indicated that Transco could continue construction in New York waters during this period if a 30-day notice is given to registered harvesters. Transco will continue to consult with the NJDEP and the NMFS about blue crab timing restrictions in New Jersey waters.

Additionally, to minimize potential impacts on Atlantic sturgeon, construction of the Raritan Bay Loop would be restricted from March 1 through June 30 from MPs 12.0 to 14.25 and MPs 30.0 to 35.5 and from October 1 through November 30 from MPs 30.0 to 35.5, but Transco is requesting modification to this schedule (see table 4.5.2-7) and will continue to consult with NMFS about this potential change. The NYSDEC and the NMFS preliminarily indicated that they would allow hand jetting and HDD pit excavation activities in the spring, and that dredging activities between MPs 30.0 and 35.5 could be conducted between March 1 and April 30 if Atlantic sturgeon were not present in the area, as predicted by water temperature and confirmed by acoustic monitoring. Transco will continue to consult with the NYSDEC and the NMFS regarding the details of the acoustic monitoring. Atlantic sturgeon are discussed further in section 4.6.3.5.

As noted above, Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during the timing restriction windows, and has requested modification to some of the timing restrictions due to construction schedule constraints. These flexibility requests are summarized in table 4.5.2-7.

In New Jersey, Transco continues to consult with the NJDEP regarding mitigation for impacts on shellfish areas, which may include a monetary contribution to NJDEP's dedicated account for shellfish habitat mitigation, in accordance with NJAC 7:7-17.9. Additionally, Transco is coordinating with the NYSDEC regarding potential mitigation strategies for clam beds and benthic habitats. We conclude that Transco's commitments to restrict work in sensitive areas as much as possible would minimize the overall impacts of the Project on fisheries resources to less than significant levels. However, because Transco has not yet finalized its consultations with the NYSDEC, NJDEP and NMFS for fisheries resources, **we recommend that:**

- **<u>Prior to construction of the Raritan Bay Loop</u>, Transco should file with the Secretary documentation of consultation with the NYSDEC, NJDEP, and NMFS regarding its final proposed mitigation for fisheries and aquatic resources, including timing restriction commitments and allowable work within these periods.**

TABLE 4.5.2-7

Summary of Transco's Flexibility Requests for Time of Year Restrictions

Activity	Location	Species and Time of Year Restriction	Requested Flexibility Date	Transco's Request	Justification
All construction activity	NJ – Nearshore (MP 12.5 to 14.0)	Horseshoe crab (4/15 to 9/15)	5/1 to 9/15	Allow construction activities near Morgan shore during horseshoe crab time of year restriction	May to September is the only feasible construction window given other time of year restrictions for other species
Clamshell dredging	NY and NJ – MP 12.5 to 15.3	River herring and Atlantic sturgeon (3/1 to 6/30)	6/1 to 6/30	Allow dredging to overlap with river herring and Atlantic sturgeon window in May, or use temperature threshold	Adherence to the current time of year restriction would cause the dredging activities to overlap with the fall time of year restriction for Atlantic sturgeon
Platform pile and goal post installation	NJ – Morgan HDD Pit (MP 12.5)	River herring and Atlantic sturgeon (3/1 to 6/30)	6/9 to 6/30	Allow pile/platform installation during river herring and Atlantic sturgeon window in May, or use temperature threshold.	Adherence to the current time of year restriction would cause construction to overlap with the fall time of year restriction for Atlantic sturgeon
Clamshell dredging and pile installation	NJ – Ambrose East HDD Pit (MP 30.4)	Atlantic sturgeon (3/1 to 6/30)	6/8 to 6/30	Allow dredging and pile installation activities immediately east of Ambrose during the Atlantic sturgeon spring window	Modification of this time of year restriction would minimize the overall duration of construction activities and increase the buffer period before the fall Atlantic sturgeon fall window
Spool installation	NJ – Ambrose East HDD Pit (MP 30.4)	Atlantic sturgeon (10/1 to 11/31)	10/1 to 10/31	Allow low-impact activities within the fall Atlantic sturgeon time of year restriction	Allowance of low-impact activities would minimize the overall duration of construction activities
Hand jet/submersible pump at manifold	NY – Rockaway Transfer Point (MP 35.49)	Atlantic sturgeon (10/1 to 11/31)	6/15 to 6/30 OR 10/1 to 11/10	Allow low-impact sediment-disturbing activities during the Atlantic sturgeon spring (preferred) and/or fall window	Allowance of low-impact activities during this period would minimize the overall duration of construction activities
Spool installation, hydrotest, and drying	NY – Rockaway Transfer Point (MP 35.49)	Atlantic sturgeon (10/1 to 11/31)	10/1 to 11/30	Allow low-impact activities within the fall Atlantic sturgeon time of year restriction	Allowance of low-impact activities during this period would minimize the overall duration of construction activities
Reinstatement of Ambrose HDD Pits	NJ – Ambrose East and West HDD Pit (MP 29.5 and MP 30.4)	Blue crab (12/1 to 4/30)	12/1 to 12/10	Allow backfilling and reinstatement during blue crab time of year restriction	Allowance of activity would minimize the overall duration of construction and help avoid risk of the exposed pipeline during winter flounder time of year restriction
Reinstatement of Channel Crossings	NY – Raritan Bay Channel (MP 17.6) and Chapel Hill Channel (MP 25.0)	Winter flounder (12/15 to 5/31)	12/15 to 1/30	Allow backfilling and reinstatement during winter flounder time of year restriction	Allowance of activity would minimize the overall duration of construction and help avoid risk of damage to the exposed pipeline from traffic in channels during winter flounder time of year restriction

Transco developed the proposed route to avoid construction in USACE-designated anchorage areas to the extent practicable, as these areas would require deeper burial of the pipeline and additional installation time, resulting in greater turbidity and sedimentation impacts. Additionally, Transco's proposed use of the jet trencher method along much of the route would result in less turbidity and sedimentation impacts relative to other trenching methods. In considering the extent of the offshore impact relative to the area of similar habitat available in the New York Bight, as well as the rate of recovery by the affected species, no significant, long-term impacts on the benthic community and other offshore resources are expected from the seafloor-disturbing activities. However, to verify that benthic communities recover as expected, **we recommend that:**

- **Prior to construction of the Raritan Bay Loop, Transco should file with the Secretary a 5-year post-construction benthic sampling and monitoring plan, prepared in consultation with the NMFS, for review and written approval of the Director of OEP. The plan should identify the timing of sampling surveys, success criteria for assessing recovery of benthic species, and reporting requirements.**

Resuspension of Contaminated Sediments

Seafloor-disturbing construction activities could resuspend sediment-bound contaminants into the water column, which could expose biota to contaminants and have a direct negative impact on managed species and other aquatic organisms. Aquatic organisms can be exposed to resuspended contaminants via ingestion with food, through membrane-facilitated transport, or passive diffusion (Eggleton and Thomas, 2004). Contaminant uptake mechanisms and rates vary among and within species, life stage, season, behavior, reproductive status, and history of previous exposure. Contaminants that are mobilized could also be bio-transferred within food chains with the potential to cause injury. To assess these risks, Transco conducted sediment sampling along the proposed pipeline route in late 2016 and spring 2017, including within the Raritan Bay Slag (RBS) Superfund site near the Morgan Shore Approach HDD exit point (see section 4.7.8.2). Additional sediment sampling was conducted in 2018 at the request of the NJDEP and USACE to further characterize sediments for onshore disposal or disposal in the HARS and to characterize the geotechnical and chemical composition of offshore sediment within the Raritan Bay Channel and Chapel Hill Chanel at depths deeper than previously sampled. Analysis of vibracore samples collected during the surveys indicated that most of the sample sites had at least one contaminant that exceeded upper-level effects thresholds, i.e., New York Class C and/or New Jersey Effects Range – Medium sediment screening thresholds. These elevated contaminant levels were generally restricted to the upper 3 feet of the seafloor. Concentrations of organic contaminants were greater than upper-level effects thresholds at approximately 33 percent of the sample sites. Approximately 83 percent of the sample sites had at least one exceedance of an inorganic (metal) threshold. Exceedances of upper-level effects thresholds for heavy metals (e.g., copper, lead, zinc, mercury), were detected at multiple locations. These included exceedances for mercury at one site; lead and mercury at one site; lead, zinc, and mercury at two sites; and copper, lead, and mercury at one site. These results are consistent with previous findings, such as a 1993/1994 study by the EPA that estimated that approximately 82 percent of the surface sediment in the Lower New York Bay, Raritan Bay, and Sandy Hook Bay complex was enriched with at least one metal from anthropogenic sources (Adams et al., 1998).

Of all of Transco's sampling sites, site VC-1 within the RBS Superfund site near the Morgan Shore Approach HDD exit, and sites VC-16 and VC-17 near the Raritan Bay Channel crossing, exhibited a greater number of exceedances of established thresholds for several contaminants at all depth intervals and are therefore considered to be representative of the worst- case sediment conditions that could be encountered along the offshore pipeline route. The exceedances at these sample sites were for dioxins, polychlorinated biphenyls (PCBs), certain polycyclic aromatic hydrocarbons, and metals (including mercury). As discussed in section 4.7.8.2, the EPA has established a lead cleanup goal for the RBS Superfund site of 400 milligrams per kilogram (mg/kg), and the maximum concentration of lead in sediment samples from all of Transco's vibracore sample locations, including in the RBS Superfund site, was 285 mg/kg. Additionally, the nearest area of the RBS Superfund site designated for cleanup is more than 200 feet from proposed Project excavations.

In response to a NYSDEC comment about contaminant modeling, Transco conducted hydrodynamic and contaminant transport modeling for analytes that exceeded Class C thresholds and high Class B concentrations in sediment samples. Contaminant transport modeling was performed using RPS's CHEMMAP modeling system, which uses hydrodynamic outputs of the WQMAP/BFHYDRO system to predict the 3-dimensional transport and fate of chemicals and metals in marine environments.[24] Table 4.5.2-8 lists the sample sites in New York where Class C exceedances and high Class B concentrations were measured, along with the model-predicted maximum concentration at a distance of 500 feet (152 meters) from the proposed sediment disturbing activities.

The modeling results indicate that, with the exception of mercury, all of the modeled maximum concentrations of Class C contaminants would not be expected to exceed New York State water quality criteria at the edge of a 500-ft mixing zone. For the majority of the modeled scenarios, the maximum total mercury concentrations were predicted to be slightly above the variance-based mercury concentration standard of 0.05 μg/L. However, in the contaminant transport modeling, the clamshell dredging rate was typically assumed to be 11,250 ft^3/hr, in order to match the assumptions of the corresponding suspended sediment modeling scenarios. The exception was the modeling for mercury dispersion for dredging activities near VC-37, which assumed a slower clamshell dredging rate of 7,500 ft^3/hr. Based on information from its offshore contractor, Transco estimates that the actual rate of dredging for Class C sediments would range from approximately 2,850 to 8,450 ft^3/hr. Thus, the modeling results are conservative, and Transco expects that the water quality standard for mercury would be met at the edge of a 500-foot mixing zone during clamshell dredging activities that employ an environmental bucket and no scow overflow. Additionally, Transco would use dredging rates slower than 7,500 ft^3/hr as necessary, based on field monitoring, to help ensure compliance with the water quality standard for mercury at sites with Class C concentrations of mercury.

The modeling results for high Class B contaminants generally indicate that, with the exception of copper, contaminant concentrations would not be expected to exceed New York State water quality criteria at the edge of a 500-ft mixing zone. For two of the modeled scenarios, the predicted maximum concentrations for copper exceeded the lowest applicable (chronic toxicity) standard of 3.4 μg/L (dissolved). As discussed above, clamshell dredging was conservatively assumed to occur continuously at a rate of 11,250 ft^3/hr in the contaminant transport modeling. Transco does not expect the actual rate of dredging in these contaminated areas to exceed 8,450 ft^3/hr, which would reduce dredging-related copper concentrations in the water column. Transco would also utilize slower dredging rates as necessary, based on field monitoring, to ensure compliance with the water quality standard for copper at the edge of the 500-foot mixing zone.

[24] Accession number 20180601-5121, Attachment 5; Accession number 20181102-5201, Attachment 3.

TABLE 4.5.2-8

Summary of Class C and High Class B Sediment Contaminant Modeling Results for the Northeast Supply Enhancement Project

Vibracore Sampling Site	Milepost	Modeled Installation Method	Contaminant	Water Quality Criterion (µg/L) [a]	Maximum Contaminant Concentration at 500 ft (µg/L)
Class C					
VC6	14.41	Clamshell Dredge	Mercury	0.05 [b]	0.07
			Arsenic	63	3.0
VC7	14.79	Clamshell Dredge	Mercury	0.05 [b]	0.08
			Silver	0.95 [b]	0.15
VC16	17.51	Clamshell Dredge	Mercury	0.05 [b]	0.1
			Silver	0.95 [c]	0.2
			Nickel	8.2	2.0
			Lead	8.0	7.0
			Zinc	66	7.0
			PCB Congeners	0.2 [d]	0.03
VC17	17.67	Clamshell Dredge	Mercury	0.05 [b]	0.09
			Silver	0.95 [b]	0.17
			Lead	8.0	6.0
			Zinc	66	14.0
VC37	24.65	Clamshell Dredge	Mercury	0.05 [b]	0.12
VC38	24.85	Clamshell Dredge	Mercury	0.05 [b]	0.05
VC42	25.41	Clamshell Dredge	Mercury	0.05 [b]	0.05
VC64	33.73	Clamshell Dredge	Mercury	0.05 [b]	0.04
Class B					
VC-7	14.79	Clamshell Dredge	Copper	3.4	8.0
			Zinc	66	14.0
VC-16	175.51	Clamshell Dredge	Copper	3.4	6.0
			Total PCB Aroclors	0.2 [d]	0.02
VC-17	17.67	Clamshell Dredge	Total PCB Congeners	0.2 [d]	0.02
			Total PCB Aroclors	0.2 [d]	0.02
VC-42	25.41	Clamshell Dredge	Lead	8.0	2.7

[a] Chronic toxicity levels are based on 6 NYCRR 703.5 for Class SA/SB waters unless otherwise noted.

[b] Mercury criterion reflects a variance-based standard, per guidance from NYSDEC in a Request for Additional Information dated September 14, 2018.

[c] No chronic toxicity level for silver is presented in 6 NYCRR 703.5. Chronic toxicity level in this table is based on NOAA 2008 Screening Quick Reference Tables. This level is half the value of the acute toxicity level identified in the EPA National Recommended Water Quality Criteria for Aquatic Life in marine waters.

[d] PCB criterion presented is for individual PCB Aroclors, and reflects a detectability-based standard per guidance from NYSDEC in a Request for Additional Information dated September 14, 2018. There is no standard in 6 NYCRR 703.5 for PCB congeners, so the Aroclor-based standard is presented for comparison.

Most metals and other compounds present in contaminated sediments are generally not readily available in a soluble form, but rather as part of an iron complex or in association with organic matter and clays (LaSalle et al., 1991). Metals that are resuspended into the water column have a strong tendency to associate with particulate sediments, organic carbon, and ferrous oxides, which limits their bioavailability within the water column and redeposited sediments. Reduced iron that is oxidized during sediment suspension would actively scavenge metals and other compounds, causing them to settle to the bottom where they are again reduced under anoxic conditions (LaSalle et al, 1991). In laboratory studies, Gustafson (1972) tested the adsorption of various toxic metals to clay when subjected to agitation (similar to what would occur during the resuspension of bottom sediments). Results indicated that agitation increased the adsorption of metals onto the clay particles, removing approximately 69.8 percent of copper, and 97.4

percent of mercury in solution. Furthermore, the sediment transport modeling conducted by Transco indicated that contaminated sediment could be redistributed several hundred feet from the source of the sediment disturbance, which would further dilute resuspended contaminants. Additionally, similar levels of contamination are expected to be present in the existing surface sediments at areas in and near the offshore workspaces. Based on the relatively limited distribution of upper-level exceedances for mercury and other heavy metals along the Project route, the short duration of turbidity plumes, Transco's contaminant transport modeling, and the expected fate of metals released into the marine environment, the risk to aquatic resources from exposure to resuspended metals is expected to be low. However, Transco is continuing to consult with the EPA regarding construction in the RBS Superfund site.

The fate of resuspended organic compounds following a sediment-disturbing event is highly dependent on the hydrodynamics, biogeochemical processes, redox potential, pH, salinity, and temperatures of the receiving environment (Eggleton and Thomas, 2004). Hydrophobic organic contaminants generally readily desorb or release from sediment surfaces over time (Lamoureux and Brownawell, 1999). Desorption rates and times also depend on the size of the sediment particles and for PCBs, the degree of chlorination (Borglin et al., 1996), with highly chlorinated PCBs and hydrophobic contaminants with large partition coefficients desorbing more slowly (Eggleton and Thomas, 2004). A small fraction of PCB congeners are thought to be desorption-resistant (Lamoureux and Brownawell 1999). The extent of desorption resistance has been found to be correlated with the residence time of the contaminant in the sediment (Chen et al., 1999), such that historically contaminated sediments (like those in the Project area), may be more resistant to contaminant desorption (Eggleton and Thomas, 2004). As mentioned above, the transport of sediments over a large geographic area would also aid in the dilution of resuspended contaminants.

To provide a conservative worst-case bioaccumulation estimate of organic compounds by benthic organisms following sediment disturbance, Transco applied the Theoretical Bioaccumulation Potential (TBP) model (McFarland and Clarke, 1999) to the hard clam (*M. mercenaria*) and *Nereis virens*, a common polychaete worm species in the New York Bight. PCBs were selected to represent organic compounds in the analysis due to their high potential for bio-uptake and bio-transfer within marine food chains. The TBP model is commonly utilized in the evaluation of dredged sediment for open-water disposal, and estimates the probable concentration of a contaminant that would bioaccumulate in an organism after continuous exposure to contaminated sediment. In the model, total organic carbon in the sediment and lipid content of the organism are primary drivers in the calculation of the expected equilibrium concentration in an exposed organism (McFarland, 1984; McFarland and Clarke, 1986). The TBP model is conservative, and tends to overestimate the bioaccumulation of hydrophobic organic contaminants (Clarke and McFarland, 2000). Transco applied the TBP model to *M. mercenaria* and *N. virens* using the maximum and mean total PCB concentrations found in sediments at sampling site VC-16, which is where the highest PCB concentrations were detected in the sampling effort along the offshore route.

Using the maximum and mean PCB sediment concentrations of 2.0 and 0.796 mg/kg, respectively, from site VC-16, Transco's TBP model results for hard clam PCB whole-body concentrations were 0.123 and 0.049 mg/kg. In comparison, Rubinstein et al. (1983) conducted PCB accumulation studies on benthic species using sediment from the New York Harbor and found that for sediment PCB concentrations ranging from 0.46 to 7.28 mg/kg, hard clam tissue never exceeded 1.3 mg/kg during the 100-day study period. After 100 days, hard clam tissue concentrations of PCBs fell to 0.6 mg/kg or less for all four types of sediments tested. The NJDEP has documented PCB concentrations in hard clams in Raritan Bay of between 0.0138 and 0.0392 mg/kg (NJDEP, 2001). Given that the majority of sampled sediments from the Project area had PCB concentrations much lower than those at VC-16, hard clam PCB tissue concentration resulting from Project-related sediment redeposition would be expected to be similar to or less than historical tissue concentrations after completion of the Project.

Transco's TBP model results for *N. virens* tissue concentrations were 0.090 and 0.036 mg/kg for the maximum and mean PCB sediment concentrations, respectively, from site VC-16. Rubinstein et al.'s (1983) study of sediments from the New York Harbor also assessed bioaccumulation of PCBs in *N. virens* and found that the resultant tissue concentrations were a maximum of 0.6 mg/kg and a mean of 0.4 mg/kg after 60 days of exposure. These values are an order of magnitude higher than those predicted by Transco, suggesting that the Project-related sediment redeposition would not substantially increase the historic bioaccumulation of PCBs in the benthic community. We received comments on the draft EIS requesting that more recent reference points than this 1983 study be used for comparison. However, the Rubenstein et al. (1983) study was the most comprehensive study identified by Transco and the FERC for defining PCB body burdens in the polychaete *N. virens,* due to the need for both information on the lipid concentration of the taxa being modeled and an understanding of background PCB concentrations in the species.

In summary, contaminants that become resuspended during sediment-disturbing construction activities are expected to generally be adsorbed to organic material and fine-grained sediment, and redeposited as sediment-bound compounds. Contaminant concentrations would also be diluted by the transport of sediments away from the source. The redeposited sediment is expected to be similar in contaminant concentration to the ambient conditions of the surface sediments at the depositional locations. The results of Transco's TBP modeling using maximum PCB concentrations measured along the offshore route suggest that the entrainment and redeposition of even the most contaminated sediments would not substantially adversely affect aquatic resources or food webs. Transco has secured a preliminary agreement with an upland disposal facility in New Jersey to accept all clamshell-dredged material (including sediment and entrained water) with contaminants that exceed NYSDEC Class C thresholds. In clamshell-dredged areas of New York that do not contain Class C sediments, scow barge overflow would function as the method of dewatering. Scow overflow would only occur in New York waters where clamshell dredging of non-Class C sediments would not result in an exceedance of New York State water quality standards. Additionally, Transco would use an environmental bucket during all clamshell dredging (unless the environmental bucket encounters refusal due to hardpan or bedrock), and no barge scow overflow would occur in areas of elevated contaminants (e.g., NYSDEC Class C sediments). The NYSDEC has also indicated that monitoring of the water column for chemical contaminants would be required in New York State to ensure compliance with state water quality standards. Transco is consulting with the NYSDEC to determine specific requirements and the extent of such monitoring, and has committed to comply with monitoring requirements set forth in the Project's NYSDEC Water Quality Certification. Therefore, we conclude that the resuspension of contaminated sediments would result in temporary and minor impacts on water quality and would not pose a significant risk to aquatic species. However, to more precisely inform the record, **we recommend that:**

- **<u>Prior to construction of the Raritan Bay Loop</u>, Transco should file with the Secretary the final volume of dredge material for disposal at onshore and offshore locations; the final onshore and offshore dredge disposal sites; and agency comments for disposal sites.**

Horizontal Directional Drilling

The HDD method would be used to install the Raritan Bay Loop beneath the Morgan shoreline and the Ambrose Channel, and to install the Long CP Power Cable associated with the CP system. The HDD method would allow the pipeline and CP system to be installed beneath the seafloor without directly affecting offshore resources, except in the location of the exit/entry pits.

Sections 2.3.2.1 and 2.3.3.5 describe the HDD method in detail, including the makeup of drilling fluid, stabilization of the prefabricated HDD string on the seafloor, and specific design elements that would minimize the potential for HDD drilling fluid loss into the water column. In general, these design elements include the use of surface casing at the entry and exit points for the Ambrose Channel HDD and the excavation of pits at each offshore HDD entry and exit point to contain drilling fluid and cuttings.

Transco also provided an Offshore Horizontal Directional Drill Contingency Plan (see table 2.3-3) that details the construction procedures that would be implemented to reduce the potential for an inadvertent release to occur during drilling, and the measures that would be undertaken in the event of an inadvertent release. In section 2.3.3.5 we conclude that the overall potential for a significant loss of drilling fluid in the offshore environment is low.

Transco designed the excavation dimensions of the offshore HDD pits such that they would be of sufficient size to contain the expected volume of drilling fluid and cuttings generated by HDD operations, plus 25 percent. Bentonite in the drilling fluid is expected to settle at the bottom of the HDD pits due to particle aggregation (flocculation) as the drilling fluid enters the marine environment (Berner and Berner, 1996; Middleton and Southard, 1977; Akther et al., 2008). Based on the density and cohesive properties of the drilling fluid in saltwater, the material is expected to remain stable at the bottom of the pit and not escape into the surrounding area. During construction of the Rockaway Delivery Lateral Project, where HDD fluid and cuttings were discharged into an exit pit seaward of the Rockaway Peninsula, no visible turbidity plumes and no elevated TSS were observed at the down-current compliance point (A.H. Glenn and Associates Services, 2011). Following completion of HDD activities, Transco would cap the HDD pits with native sediments or other suitable fill material.

In the event of an inadvertent release, bentonite clay particles would be expected to settle quickly; however, if sufficient current velocities were present, the particles could become entrained in the water column and transported to other locations, causing turbidity and sedimentation. Mobile offshore resources could be temporarily displaced by a turbidity plume, and depending on the thickness of materials settling on the seafloor, sessile benthic organisms and demersal eggs/larvae could be at risk of smothering or other injury.

To minimize the potential for toxic impacts on offshore resources, Transco proposes to use a NSF/ANSI-approved, water-based drilling fluid as opposed to petroleum-based mud systems that have been shown to have higher chronic toxicity effects (Cranford et al., 2001). The drilling fluid would contain additives that affect the properties of the fluid. For example, additives are used to provide viscosity control, stabilize the fluid, enhance the rate of penetration, and cool and lubricate the drilling equipment. Transco is working with its contractors to finalize the specific additives that would be used in HDD construction. The currently proposed HDD additives are MAX-GEL (bentonite), soda ash (sodium carbonate), Platinum Pac (polyanionic cellulose polymer), Duo-Vis/Super-Vis (biopolymer/xanthan gum), and Plugz-IT Max (silica and other non-hazardous minerals). Equivalent products from other vendors may be used as alternatives. Transco has filed the safety data sheets for these products and expects that the proposed HDD fluid would not result in adverse effects on aquatic organisms beyond the HDD entry and exits pits. The ecotoxicity of a majority of the additives typically used in HDD operations have been tested for one or more aquatic species and determined to be either not acutely toxic or slightly toxic. Additionally, the combined initial concentrations of bentonite and other additives would likely be a small percentage of the total volume of drilling fluid, and would not be expected to cause acutely toxic conditions for aquatic resources at this concentration. To ensure that the use of additives would not result in a significant impact on aquatic resources, Transco has committed to file with the Secretary a complete HDD fluid effects assessment with the Implementation Plan for the Project. This would be reviewed and approved by the Director of OEP prior to the use of the drilling fluid additives in HDD construction.

Noise

In discussing the impacts of sound on aquatic resources, it is important to note the difference in sound intensity in air versus water. Sound intensity in air uses a standard of 20 micro-Pascal (µPa), while sound intensity measured in water uses a standard level of 1 µPa. The discrepancy relates to differences in the acoustic impedance, density, and compressibility of air and water. For example, the threshold of hearing for humans is 0 decibel (dB) (relative to (re) 20 µPa) in the air, but 62 dB (re 1 µPa) in water (Kinsler and Frey, 1962). Similarly, direct tissue damage to humans can occur at 160 dB in the air, but rises to 222 dB in water (Kinsler and Frey, 1962).

Construction of the Project would not be expected to result in substantial construction vessel noise impacts. 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. Therefore, propeller use by the larger Project-related vessels would be limited, and dynamic positioning thrusters would not be used due to the shallow nature of waters in the Project area. Transco estimates that Project-related construction vessels could generate underwater noise that peaks between 140 to 180 dB re 1 µPa at 3.3 feet at frequencies between 0.1 and 1 kilohertz (kHz) (LGL and JASCO, 2005). However, the Project area is in the vicinity of shipping lanes associated with the Port of New York and New Jersey, which is the largest port on the east coast of the United States. Based on the proximity of the pipeline route to this major shipping center, the background noise is likely dominated by large vessels (e.g., container ships) that produce source levels of 180 to 190 dB (re 1 µPa based on the root-mean-squared (RMS) metric) at frequencies between 200 and 500 hertz (Hz) (OSPAR Commission, 2009; Jasney et al., 2005). Therefore, the background noise in the underwater environment is likely similar to the noise that would be generated by the largest vessels that would be used during construction of the pipeline. As such, we do not expect that the relatively small number of vessels associated with the Project would substantially affect the existing underwater noise environment or aquatic resources.

Since the issuance of the draft EIS, Transco proposed several changes that would increase the number and size of temporary piles needed to construct the Raritan Bay Loop (see table 2.3.3-4). Transco now proposes to install a total of 163 temporary piles, ranging in size from 10 inches in diameter to 60 inches in diameter. Of the 163 piles, 34 piles would be installed via a combination of diesel impact hammer and vibratory device. The remainder of the piles would be installed with vibratory devices. As discussed in section 2.3.3.4, due to shallow water that would prevent access of a pipelay barge, Transco proposes to construct a temporary fixed platform to support the Morgan Shore Approach HDD and construction of the Raritan Bay Loop between MPs 12.5 and MP 14.5. Transco plans to install the piles associated with the temporary fixed platform with vibratory and impact hammers. Installation via impact hammer is also proposed for piles at the west side of the Ambrose Channel HDD and pipelay barge mooring piles near the Rockaway Manifold.

Impact pile driving is the most common method of pile installation and consists of a piston-type driver that uses ignition, hydraulics, or steam to lift a piston to a desired height and then drop the piston against the head of the pile to drive it into the substrate (California Department of Transportation, 2009). Impact pile driving is considered an impulsive sound source, the magnitude and characteristics of which depend on the pile size, pile composition, energy of the strike, and substrate composition. Vibratory devices use oscillatory hammers or spinning counterweights that vibrate the pile and cause the sediment surrounding the pile to liquefy, allowing the pile to move easily into or out of the sediment. Vibratory pile driving is considered a continuous low-frequency noise source because the device continuously vibrates until the pile reached the desired depth. Vibratory devices generally have sound source levels 10 to 20 dB lower than impact hammers, and the sound level generated rises relatively slowly (California Department of Transportation, 2009).

Transco anticipates that the time needed to install one pile via vibratory device is approximately 15 minutes of continuous vibration. For impact hammer-driven piles, the anticipated driving time is approximately 38 to 62 minutes per pile, with approximately 3,382 strikes per pile at the Ambrose Channel HDD, and approximately 1,920 to 2,500 strikes per pile at other locations. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. The milepost, size, type, purpose, installation time and duration, and removal time and duration of all proposed piles are summarized in table 2.3.3-4.

With the exception of marine mammals, relatively little is known about the effects from exposure to underwater sound on aquatic organisms, particularly fish (Popper and Hastings, 2009). Even in cases where data are available, most experts recommend extreme caution in attempting to extrapolate between species (Popper and Hastings, 2009). Studies have shown that caged fish exposed to sounds from an impact driver can lead to injury or death to the fish; however, these studies did not establish appropriate metrics or thresholds for injury (Stadler and Woodbury, 2009). The lack of metrics and thresholds creates a high degree of uncertainty regarding the potential for an individual project to injure fishes (Stadler and Woodbury, 2009). Because of this uncertainty, a working group of federal and state agencies, underwater acoustic experts, and fish biologists developed interim criteria for the onset of physical injury to fishes exposed to underwater sounds generated by impact pile driving (Stadler and Woodbury, 2009). However, these assessments of physical injury to fish exposed to sounds generated by pile driving are in need of further studies to refine the thresholds of effect and provide more certainty (Stadler and Woodbury, 2009). The interim criteria used two metrics including peak sound pressure level and sound exposure level. The interim criteria suggested that onset of physical injury would be expected if either the peak sound pressure level exceeds 206 dB (re 1 μPa) or the sound exposure level, accumulated over all pile strikes generally occurring within a single day, exceeds 187 dB (re 1 micro-Pascal squared second ($\mu Pa^2 \cdot sec$)) for fishes 2 grams or larger, or 183 dB for smaller fishes (Stadler and Woodbury, 2009). To assess behavioral disturbance, the NMFS has adopted a threshold criterion of 150 dB (re 1 μPa RMS) for fish of all sizes (Andersson et al., 2007; Purser and Radford, 2011; Wysocki et al., 2007). Potential noise impacts include temporary or permanent impacts on fish auditory systems that could reduce the survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success. Fish species with swim bladders are thought to be more susceptible to noise/pressure impacts. However, most fish species would be able to avoid areas of noise that would cause them discomfort or harm.

Based on Transco's acoustic modeling results, the jet trencher would produce sound levels up to 150 dB re 1 μPa at 6 to 10 feet from the source at start-up. After the jet trencher "swords" penetrate the seafloor, the noise would be dampened and is expected to drop to 110 dB re 1 μPa. Disturbance of fish species by jet trencher noise would be limited to within 10 feet from the jet trencher at start-up. Additionally, the jet trencher would advance at a rate of approximately 246 feet per hour such that vessel noise from this activity potentially exceeding 150 dB re 1 uPa RMS would affect a single location for less than a few hours. Hand jetting equipment operated at a pressure of 412 bar has been documented to produce sound levels between 135 dB and 171 dB re 1 μPa at approximately 3.3 feet from the source (Molvaer and Gjestland, 1981). Transco estimates that noise generated by hand jetting could exceed the 150 dB behavioral disturbance threshold for fish within up to 77 feet from the source. The construction activity of greatest duration is the hand-jetting that would occur seaward of the Rockaway Peninsula at the Neptune Cable crossing (MP 35.2). Transco estimates that this activity would last for 279.2 hours (11.6 days), with multiple daily breaks for crew shift changes.

Transco's acoustic modeling results indicate that the noise generated by pile driving would exceed both the injury and behavioral disturbance thresholds for fish. The 150 dB re 1 μPa behavioral disturbance threshold for fish would be exceeded up to 705 feet from the source for vibratory pile driving, and up to

32,808 feet (6.2 miles) from the source for impact pile driving. Pile driving would exceed the 206 dB re 1 μPa peak sound pressure injury threshold for fish within a limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving ranged from 3,271 to 7,037 feet (0.6 to 1.3 miles). An individual fish would need to remain within this area during the entire duration of the pile driving event to experience an injury. Additionally, these zones would be constricted by land, and some of the pile driving noise is likely to be masked by ambient noise at distances shorter than those predicted by the noise modeling. Though the duration of construction activities would be limited and most fish species would be able to leave the area of disturbance, harassment or injury of individual fish due to pile driving noise is possible. Population-level impacts of construction noise are not expected. In conclusion, pile driving and other construction-related noise impacts on fish are expected to be temporary and moderate.

Known effects of noise on marine mammals have been reviewed by various sources (National Research Council, 2003; Southall et al., 2007; Weilgart, 2007). Human-made sounds can affect the ability of marine mammals to communicate and to receive information about their environment. Such noise can interfere with or mask the sounds used and produced by these animals and thereby interfere with their natural behavior. Observed effects of noise on marine mammals include changes in vocalizations; respiration, swim speed, diving, and foraging behavior; increased alertness; temporary or permanent displacement; avoidance; shifts in migration path; stress; hearing damage; panic; and strandings (National Research Council, 2003; Southall et al., 2007; Weilgart, 2007). Noise exposure may affect the vestibular and neurosensory systems of marine mammals (primarily pinnipeds) and potentially respiratory patterns (Southall et al., 2007). Marine mammal responses to noise vary widely depending on the species, the context and duration of exposure, the type of noise source, the time of day or year, the reproductive state of the animal, the activity of the animal at the time of exposure, and the experience or prior exposure of the animal (National Research Council, 2003; Southall et al., 2007). Minor or temporary behavioral effects are often evidence that an animal has heard a sound and may not indicate lasting consequence for exposed individuals (Southall et al., 2007). Determining if short-term changes in behavior represent a biologically significant effect is difficult. Immediate or short-term changes in behavior could represent short- or long-term effects on a population. Long-term impacts of greatest concern include reduced health and viability of a population.

To determine potential impacts on pinnipeds from in-air noise, the NMFS has established a harassment threshold for all pinnipeds except harbor seals of 100 dB re 20 μPa, and a harassment threshold for harbor seals of 90 dB re 20 μPa RMS. Transco's modeling of in-air pile driving noise indicated attenuation to 90 dB RMS re 20 μPa within 0.13 mile of the source. The closest known haul-out sites for seals in the vicinity of the Project area are located approximately 1.8 miles, 6.0 miles, and 6.7 miles from the Ambrose Channel HDD site at Sandy Hook, Swinburne Island, and Hoffman Island, respectively. Based on these modeling results, in-air sound levels are not expected to exceed pinniped harassment thresholds at seal haul-out areas. Additionally, Transco proposes to conduct all pile installation and removal activities in the months of June, July, and August, when seals are less likely to be present.

As discussed in section 4.5.2.5, the NMFS defines two levels of marine mammal harassment due to noise levels under the MMPA: Level A (injury or "take") and Level B (harassment). The NMFS recently established new guidelines for assessing the effects of underwater anthropogenic noise on the hearing of marine mammals (NMFS, 2016a). The new guidelines established different effects thresholds for five functional hearing groups of marine mammals based on the differing susceptibility of those groups to noises of varying frequencies. 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 cruciger* and *L. australis*);

4) phocid pinnipeds (true seals); and

5) otariid pinnipeds (sea lions and fur seals).[25]

These new criteria are also based on different metrics than the previous criteria. The new criteria use dual metric acoustic thresholds for impulsive sounds: peak sound pressure, and cumulative sound exposure level (SEL_{cum}). For non-impulsive source, such as vibratory pile driving, the criteria specify a single SEL_{cum} for each functional hearing group.

The Level A criteria are based on the potential for a sound source to result in a permanent threshold shift (PTS), which is a permanent, 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. The non-impulsive PTS onset thresholds for a 24-hour period are as follows: 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. To determine potential behavioral impact on marine mammals from underwater acoustic sources (i.e., Level B harassment), the NMFS has established a threshold of 120 dB re 1 µPa based on the RMS metric.

The majority of the pipeline route would be installed using a jet trencher or clamshell dredge. Clamshell dredging activities are not expected to generate noise that would cause behavioral disturbance of marine mammals. Jet trenching activities may generate noise levels above 120 dB re 1 µPa RMS, but this would be limited to the few minutes before the jetting "swords" are lowered into the sediment and would occur within less than 100 feet of the trencher. Given the extremely limited duration and extent of elevated noise levels, jet trenching activities are not expected to disturb marine mammals.

The hydroacoustic modeling of noise attenuation completed by Transco conservatively estimates that impact pile driving could result in sound levels capable of causing marine mammal behavioral disturbance at up to 13.4 miles from the source for the largest piles. Vibratory pile driving and pile removal could conservatively result in sound levels capable of causing marine mammal behavioral disturbance up to 1.3 miles from the source for the largest piles. Given the amount of existing vessel traffic noise in the Project area, as well as noise monitoring reports from other recent underwater pile driving activities (e.g., Naval Facilities Engineering Command Southwest, 2018), we expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances.

The modeling indicated that impact pile driving of the largest piles would exceed the PTS thresholds for all functional hearing groups present in the Project area, ranging from a minimum of 568 feet for mid-frequency cetaceans to a maximum of 18,973 feet (3.6 miles) for high-frequency cetaceans. Vibratory pile driving and pile removal is expected to exceed the PTS thresholds for all functional hearing groups present in the Project area; however, this exceedance would occur within a relatively limited area around the sound source (i.e., less than 331 feet). Given that the pile driving injury thresholds are with respect to cumulative sound impacts, a marine mammal would need to spend approximately 24 hours within this zone of exceedance to potentially experience a PTS. Marine mammals densities in the Project area are low, and individual marine mammals would be unlikely to remain in the zone of exceedance long enough

[25] No otariid pinnipeds are found in the Project area.

to be injured by pile driving noise. Additionally, the modeled zones of the exceedance would be constricted by land and somewhat smaller than predicted by the modeling. Table 4.5.2-9 summarizes the worst-case distance to in-water behavioral and injury thresholds based on Transco's hydroacoustic modeling results.

TABLE 4.5.2-9

Worst-Case Distance to Marine Mammal Harassment and Injury Thresholds Based on Hydroacoustic Modeling Results

Functional Hearing Group	Effects Threshold (re 1 µPa)	Impact Pile Driving: Distance to Threshold (feet [miles]) [a, b]	Vibratory Pile Driving: Distance to Threshold (feet [miles]) [a, b]
Pile Installation			
In-water Behavioral Thresholds (Level B)			
Cetaceans	Impulsive: 160 dB Non-Impulsive: 120 dB RMS	7,068 (1.3)	70,682 (13.4)
Pinnipeds	Impulsive: 160 dB Non-Impulsive: 120 dB RMS	7,068 (1.3)	70,682 (13.4)
In-water PTS (Injury) Thresholds (Level A)			
Low-frequency cetaceans	Impulsive: 183 dB Non-Impulsive: 199 dB SEL_{cum}	15,928 (3.0)	141 (0.03)
Mid-frequency cetaceans	Impulsive: 185 dB Non-Impulsive: 198 dB SEL_{cum}	568 (0.1)	13 (<0.01)
High-frequency cetaceans	Impulsive: 155 dB Non-Impulsive: 173 dB SEL_{cum}	18,973 (3.6)	210 (0.04)
Phocid seals	Impulsive: 185 dB Non-Impulsive: 201 dB SEL_{cum}	8,524 (1.6)	85 (0.02)
Pile Removal			
In-water Behavioral Thresholds (Level B)			
Cetaceans	Impulsive: 160 dB Non-Impulsive: 120 dB RMS	-	70,682 (13.4)
Pinnipeds	Impulsive: 160 dB Non-Impulsive: 120 dB RMS	-	70,682 (13.4)
In-water PTS (Injury) Thresholds (Level A)			
Low-frequency cetaceans	Impulsive: 183 dB Non-Impulsive: 199 dB SEL_{cum}	-	226 (0.04)
Mid-frequency cetaceans	Impulsive: 185 dB Non-Impulsive: 198 dB SEL_{cum}	-	20 (<0.01)
High-frequency cetaceans	Impulsive: 155 dB Non-Impulsive: 173 dB SEL_{cum}	-	331 (0.06)
Phocid seals	Impulsive: 185 dB Non-Impulsive: 201 dB SEL_{cum}	-	138 (0.03)

[a] The calculated distance represents the approximate distance the sound would propagate around a single pile assuming no external impedances.

[b] Modeling results presented herein represent the maximum distance for all for all pile sizes modeled.

Transco is consulting with the NMFS and submitted a draft application for an IHA for Level B harassment in June 2018. Following the filing of the draft IHA request, NMFS provided Transco with recommended sound source levels for use in their acoustic analysis, which Transco subsequently revised and filed on October 26, 2018 to provide the "worst-case" distance to marine mammal injury and harassment thresholds presented in this final EIS. However, Transco cannot currently estimate the final number of incidental harassment takes that will be requested in their final IHA application because the take estimates are dependent on the results of a NMFS internal working group that is in the process of developing guidance on modeling acoustic harassment for short-term cumulative noise exposure. Additionally, the NMFS cannot issue an IHA more than 1 year in advance of offshore construction. As a result, final incidental take numbers are not available for inclusion in this final EIS. Transco anticipates that the final incidental take numbers would continue to support a determination that construction of the Raritan Bay Loop would result in a negligible impact on marine mammals. Transco expects that their final IHA request will include a small number of Level B harassment takes of 10 marine mammal species that may be present in the vicinity of the Raritan Bay Loop during construction: gray seal, harbor seal, harp seal, bottlenose dolphin, harbor porpoise, short-beaked common dolphin, fin whale, North Atlantic right whale, humpback whale, and minke whale. Transco does not expect Level A takes to occur as a result of the Project due the limited duration of the pile driving activities and low marine mammal densities. Since the NMFS would need to make a make a negligible impact determination and a small numbers finding in order to issue an authorization for incidental take of marine mammals under the MMPA, we conclude that underwater noise impacts on marine mammals would be temporary and minor. However, since the acoustic analysis and take estimates are not finalized, **we recommend that:**

- **<u>Prior to construction of the Raritan Bay Loop</u>, Transco should file with the Secretary, for review and written approval of the Director of OEP, its final acoustic analysis regarding marine species and a copy of the IHA request submitted to the NMFS.**

Transco has developed a Marine Mammal Observer Training and Response Protocol Plan that describes the actions that would be implemented during offshore construction to minimize impacts on marine mammals and protected species. Transco has proposed the following mitigation/monitoring procedures to minimize impacts on marine mammals resulting from pile driving activities:

- NMFS-approved observers would be deployed to conduct surveys before, during, and after all pile-driving activities to monitor for marine mammals within a 0.62-mile (1,000-meter) clearance zone. This monitoring would begin 30 minutes before and end 30 minutes after any pile driving installation or removal activity. If the pile driving device is off for more than one hour between uses, another 30-minute monitoring period would take place to clear the area before resuming operations.

- Two NMFS-approved observers would be stationed on the escort boat, with the observers visually monitoring 360 degrees around the vessel (i.e., between the pile driving and the vessel and from the vessel out to the extent of the clearance zone).

- If marine mammals are observed within the 0.62-mile (1,000-meter) clearance zone of the sound source during the 30 minutes prior to start up, start-up would be delayed until all marine mammals are observed to leave the clearance zone on their own, or until no marine mammals are observed within the clearance zone for 30 minutes. Once the zone has been cleared, the pile installation or removal activity would begin with a “soft-start.” The clearance zone is intended to prevent potential injury of marine mammals.

- Pile-driving activities would be conducted when lighting and weather conditions allow the two NMFS-approved observers to visually monitor the entire clearance zone. All in-water construction and removal activities would be conducted during daylight hours. Pile driving activities would not start if the clearance zone is not fully visible long enough to evaluate marine mammal presence.

- Sightings of marine mammals within the clearance zone would be documented and the observers would monitor the animals for any abnormal behaviors displayed while pile driving is occurring or shortly after the pile driving has ended. Abnormal behaviors could include aggressive behavior (e.g., tail/flipper slapping or abrupt directed movement), avoidance of the sound source, or an obvious startle response (e.g., a rapid change in swimming speed, erratic surface movements, or sudden diving associated with the onset of a sound source).

- Information recorded during each observation of a marine mammal would include the behavior of the animal, the number of individuals observed, the frequency of observation, the activity of the pile driver at the time of the observation (e.g., pre-pile driving, active pile driving, or post-pile driving), and the reaction of the animal to the pile driving activity.

Transco would provide the NMFS with a monitoring report within 90 days after the conclusion of the monitoring. This report would include a summary of the activity and monitoring plan (dates, times, and locations); a summary of mitigation implementation; monitoring results and a summary that addresses the goals of the monitoring plan; environmental conditions at the time of monitoring (e.g., water and weather conditions); survey data including when observations were made and the number and species of marine mammals observed; a description of observed behaviors; and an assessment of the implementation and effectiveness of the prescribed mitigation and monitoring measures.

We conclude that the methodology used by Transco to estimate noise impacts due to pile driving activities is reasonable, but we recognize that the actual noise levels could differ from the predicted noise due to a number of factors. For these reasons, and to ensure that the actual noise is consistent with the predicted values, **we recommend that:**

- **<u>Prior to construction of the Raritan Bay Loop</u>, Transco should file with the Secretary, for review and written approval of the Director of OEP, a pile driving noise monitoring and mitigation plan. The plan should include:**

  a. a description of the equipment and methods Transco would use to measure noise during pile installation and removal;

  b. a typical figure depicting where the measurement equipment would be placed relative to the piles;

  c. provisions for reporting noise to the FERC and the NMFS;

  d. mitigation measures that Transco would implement to reduce noise to acceptable levels if the noise exceeds predicted levels; and

  e. comments on the plan from the NMFS.

Hydrostatic Test Water Withdrawal and Discharge

Approximately 3,489,482 gallons of seawater would be withdrawn from the marine environment for hydrostatic testing of the Raritan Bay Loop. The seawater would be withdrawn at a fill rate of approximately 2,350 gpm filtered through a 200-size mesh screen (i.e., with a mesh opening of 0.0029 inch). The water intakes would be positioned approximately 10 feet below the surface in water depths greater than 20 feet. In water depths shallower than 20 feet, Transco would position the water intake at mid-depth in the water column. During the process of withdrawing water from the marine environment, organisms that can physically fit through the mesh on the intake screen could become trapped (entrained) in the pipeline, and larger organisms could be impinged on the screen. While all entrained organisms would likely perish, adverse effects at the population level are not expected due to the small area likely to be influenced by the intake, and the short duration of the withdrawal operation.

Transco plans to store the test water in the pipeline for at least 7 days, but potentially as long as 6 months, prior to discharge. After evaluating potential options, Transco has selected the biodegradable additive CORRTREAT 15316 for use in the hydrostatic test water to prevent pipeline corrosion. CORRTREAT 15316 would be added to the hydrostatic test water in the pipeline at a concentration of 300 parts per million (ppm). The test water would also be treated with a non-toxic fluorescent dye, Hydro Tag Clear, at a concentration of approximately 23 ppm to help detect potential leaks. Transco does not propose to use any other additives during hydrostatic testing of the Raritan Bay Loop.

Transco conducted a series of laboratory bioassays to measure the acute effects of CORRTREAT 15316 on two marine organisms: inland silverside (*Menidia beryllina*) as a proxy for marine fish species, and opossum shrimp (*Americamysis bahia*) as a proxy for marine invertebrate species. The selected bioassays were 48-hour acute static renewal toxicity tests designed to measure the toxicological effects of Laboratory Prepared Chemically Treated Seawater (LPCTS) to which 300 ppm of CORRTREAT 15316 had been added and aged for 7 days (to mimic the minimum holding time of the hydrostatic test water in the pipeline). The tests were performed in accordance with the methods established by the EPA for use in the NPDES permit program to identify effluents and receiving waters containing toxic materials in acutely toxic concentrations (EPA, 2002). Transco's bioassays consisted of LPCTS concentrations of 5, 10, 20, 40, and 80 percent, which correspond to 15, 30, 60, 120, and 240 ppm of CORRTREAT 15316, respectively. Based on the proposed discharge rate, and assuming a 4-inch pipe, the expected critical dilution of CORRTREAT 15316 in the hydrostatic test water would be approximately 20 percent (60 ppm). As such, the bioassays included concentration rates much higher than those anticipated to be present in the hydrostatic test water discharge. The results of Transco's testing showed that the No Observed Effect Concentration (NOEC) for impaired survival was 80 percent LPCTS (240 ppm) for inland silverside and 40 percent (120 ppm) for opossum shrimp, both of which well exceed the expected critical dilution of CORRTREAT 15316 in the hydrostatic test water discharge (i.e., 20 percent, 60 ppm). The NOEC is the concentration in an environmental compartment (e.g., seawater) below which adverse effects are unlikely to observed. Survival of inland silverside exposed to LPCTS with CORRTREAT 15316 aged for 7 days was not reduced at any concentration tested, including the critical dilution expected for the proposed discharge (i.e., 20 percent LPCTS). Survival of opossum shrimp was reduced significantly at 80 percent LPCTS, but this concentration is much higher than the 20 percent LPCTS expected for the proposed discharge.

Transco also conducted a test of the biodegradation potential of CORRTREAT 15316 in seawater over a 28-day period. The concentration of CORRTREAT 15316 degraded fairy quickly from 300 ppm at the start of the experiment to approximately 30 ppm at 28 days. Extrapolation of these results suggests that CORRTREAT 15316 in the hydrostatic test water would degrade to approximately 10 percent of its initial concentration after 1 month of retention in the pipe, and less than 1 percent at the end of 2 months. Given its relatively rapid degradation in seawater, the proposed critical dilution for the discharge, and the results of Transco's bioassays, the use of CORRTREAT 15316 in the hydrostatic test water would not be expected to bioaccumulate in aquatic food webs or result in adverse impacts on aquatic organisms.

Transco did not conduct bioassays on Hydro Tag Clear because of the availability of sufficient information from previous toxicity testing and the low concentrations proposed for use in this Project. The Safety Data Sheet for Hydro Tag Clear provides toxicity data for two of the product's components — dimethylformamide (DMF) and boric acid — for fathead minnow (*Pimephales promelas*) and the planktonic crustacean *Daphnia magna*. Both DMF and boric acid make up less than 0.1 percent of the product by weight. The Safety Data Sheet states that the exact concentrations of the product's other components do not contribute to its classification and are proprietary. The Safety Data Sheet reports the LC50 and EC50 for DMF and boric acid. The LC50 is the lethal concentration to 50 percent of exposed organisms (fathead minnow, in this case). The EC50 is the median effective concentration that results in *Daphnia* immobilization. The LC50 for fathead minnow was 10,410 ppm of DMF and 1,020 ppm of boric acid. For *Daphnia*, the EC50 was 7,500 ppm of DMF and 115 ppm of boric acid. Additionally, previous bioassays of Hydro Tag Clear conducted on inland silverside and opossum shrimp showed NOECs for both survival and growth at 200 ppm at a critical dilution of 25 percent (Element Material Technology, 2014). These results suggest that Transco's proposed use of Hydro Tag Clear at a low concentration of 23 ppm would not be expected to adversely affect marine organisms. Additionally, the bioaccumulation potential of Hydro Tag Clear is expected to be very low due to its solubility in seawater.

Following the completion of each test, the water would be discharged back into the marine environment through a multi-port diffuser in accordance with applicable standards and permits, such as the New York State water quality standards and the NYSDEC water quality certificate. The test water would be pumped back into the marine environment at a rate of approximately 2,350 gpm. This would re-oxygenate and mix the discharged water with the surrounding seawater thereby dispersing (diluting) the concentration of additives in the test water. Due to the low concentrations of additives expected in the discharge, the results of toxicology testing, and the short-term nature of the discharge, hydrostatic testing would not be expected to cause adverse effects on aquatic resources in the Project area.

Vessel Activity

Larger offshore organisms, particularly marine mammals, could be vulnerable to vessel strikes during construction of the proposed Project. Vulnerability to collision with a construction or support vessel would be greatest while these animals feed, swim, and rest near the surface of the water. In areas of intense ship traffic, whales and dolphins can experience propeller or collision injuries; however, most of these injuries are caused by small, fast moving vessels.

Construction of the Project would result in an increase in vessel traffic, but the effect would be small and localized relative to existing traffic into and out of the busy Port of New Jersey and New York (see section 4.8.7.3). Construction of the offshore pipeline is expected to last up to 9 months, with offshore construction activities potentially occurring 24 hours a day, 7 days a week. After transiting to a work site, construction vessels would either progress slowly along the pipeline route (e.g., during pipelay) or be temporarily stationed at a single work site (e.g., during HDD pit excavation). Additionally, 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; thus, propeller use by the larger Project-related vessels would be limited. At any given location along the proposed offshore pipeline route, the time needed for construction activities would range from a few hours to a few weeks, and would likely include several breaks in activity due to crew shift changes, weather windows, etc. The construction activity of greatest duration would be the hand-jetting that would occur seaward of the Rockaway Peninsula at the Neptune Cable crossing (MP 35.2). Transco estimates that this activity would last for 279.2 hours (11.6 days), with multiple daily breaks for crew shift changes.

Over the 9-month construction period, the average number of Project-related construction vessels working in the area would be about 20 vessels, with a maximum of 40 vessels. Additional traffic would occur due to Project-related vessels transiting to and from the HARS. Project-related vessels (and their typical drafts) are described in section 2.3.3.1 and table 2.3.3-2. Vessel traffic would temporarily increase in the Arthur Kill, Newark Bay, Kill Van Kull, Upper New York Bay, and Lower New York Bay, as construction and support vessels transit from the proposed pipe storage and contractor yard in Elizabeth, New Jersey, to destinations along the offshore pipeline route. Transco has also proposed the use of an additional contractor yard in Bayonne, New Jersey. This contractor yard is closer to the offshore Project workspace, has more direct access than the contractor yard in Elizabeth, and would avoid increasing vessel traffic along the Arthur Kill or Kill Van Kull waterways. The depths along Transco's proposed vessel transit routes are approximately 50 feet, and the deepest anticipated draft of Project-related vessels is 18 feet. Not all deployed vessels would be transiting each day, as some would be stationed in the offshore and only occasionally return to dock to refuel or due to unfavorable weather conditions.

Transco would implement its Marine Mammal Observer Training and Response Protocol Plan and utilize NMFS-approved observers to monitor for protected species and marine mammals during construction activities. When transiting to the offshore construction area, observers would maintain watch for protected species, observe vessel speed, and recommend navigation changes or full stops of the vessel to avoid striking a protected species. Vessels associated with pipeline construction would comply with vessel speed restrictions, approach/distance restrictions, and observer/lookout protocols required by the NMFS. All transiting vessels would maintain a minimum distance of 1,500 feet from North Atlantic right whales, 100 feet from all other whales, and 150 feet from sea turtles, dolphins, and porpoises. Additionally, Transco has stated that all vessels 65 feet or longer would travel at speeds no greater than 10 knots while traveling within the right whale SMA between November 1 and April 30 (see section 4.6.3.1 and figure 4.6.3-1). With Transco's implementation of these measures, the impact of vessel traffic and vessel strikes on offshore resources is anticipated to be temporary and negligible during construction.

Spills and Operational Waste

Offshore wildlife and aquatic resources could be affected by a spill of hazardous materials or by ingesting or becoming entangled in trash and debris. Minor releases of hydrocarbons (e.g., fuel, lubricants) during construction could originate from accidental spills from construction barges or support vessels, loss of fuel during fuel transfers, or other accidents such as collisions, allisions, or groundings. The impacts of hydrocarbons are caused by either the physical nature of the material (e.g., physical contamination and smothering) or by its chemical components (e.g., toxic effects and bioaccumulation). These impacts would depend on the depth and volume of the spill, as well as the properties of the material spilled.

All offshore vessels would be 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]), and would be required to register for the EPA NPDES Vessel General Permit, which includes measures to protect against impacts associated with discharges incidental to the operations of commercial vessels. Transco would also adhere to the USCG marine trash policy. These measures would protect marine life from the potential impacts of trash, debris, and hazardous spills. Transco's Spill Plan also includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction. By adhering to applicable regulations and implementing the Spill Plan, significant impacts on offshore wildlife and aquatic resources would be avoided.

Hydrographic Surveys

Transco plans to conduct hydrographic surveys to verify bottom features in advance of and concurrent with pipe-laying activities along the Raritan Bay Loop. Within 30 days following the completion of all backfilling activities for the Raritan Bay Loop, Transco would conduct a hydrographic survey to verify that the contours of the seafloor have been restored. The hydrographic survey equipment used for the Project could include a single- or multi-beam echo sounder, a high-resolution side-scan sonar, and/or a magnetometer. These devices produce pulsed noise at very high frequencies, typically 240 kHz and greater for a multi-beam echo sounder and 400 to 900 kHz for side-scan sonar, with even higher frequencies preferred for ultra-high-resolution images (Bureau of Ocean Energy Management, 2014; ESS Group, 2011b; McGowen and Morris, 2013). The magnetometer also operates in very high frequency ranges.

A frequency-modulated (chirp) acoustic sub-bottom profiler may also be used during construction to help detect buried features and confirm the final burial depth of the pipeline. This type of device typically emits sound in the range of 0.3 to 24 kHz at levels up to approximately 210 dB re 1 uPa RMS at 1 meter (Crocker and Fratantonio, 2016). However, Transco anticipates using an equipment model with a maximum output of approximately 180 dB re 1 μPa RMS in the range of 2 to 24 kHz. The sub-bottom profiler would likely be used for two surveys along the entire route (pre- and post-backfill). Transco estimates that each survey would last approximately 10 days, with the profiler in use for up to 24 hours per day.

In order for an animal to respond to a sound source, that sound must be within a range that can be perceived by the animal. The operating frequencies of the magnetometer, multi-beam echo sounder, and side-scan sonar survey equipment are outside of the generalized hearing ranges for all five marine mammal functional hearing groups, as the upper limit of the generalized hearing ranges for mid-frequency and high frequency cetaceans is 160 kHz (NMFS, 2016a). The operating frequencies of the survey equipment are also outside of the hearing ranges for the vast majority of fish species in the Project area. According to Popper and Hastings (2009), the majority of fish species are able to detect sounds from below 50 Hz up to 500–1500 Hz, with smaller numbers of species capable of detecting sounds over 3 kHz. A very limited number of species can detect sounds to well over 100 kHz; these species appear to be limited to the members of the clupeiform genus *Alosa*, e.g., American shad (Mann et al., 2001).

The noise produced by the sub-bottom profiler would likely be audible to marine mammals and a small number of fish species. However, the intensity of this sound source would be low and of limited duration. For example, in Transco's analysis for its draft IHA request, the intensity of the sub-bottom profiler was low enough to result in no estimated acoustic harassments of marine mammals. The maximum estimate of Level B harassment for the hydrographic surveys was 0.00014 harbor seals per day. Additionally, motile aquatic organisms would be capable of leaving areas that cause discomfort or annoyance. We conclude that the proposed hydroacoustic surveys would not have adverse effects on aquatic resources.

Operations

Operational activities for the Raritan Bay Loop would include maintaining, inspecting, repairing, and cleaning the pipeline. Within 10 years of being placed into service and every 7 years thereafter, Transco would inspect the Raritan Bay Loop with an intelligent pig, which does not require the removal of sediment, and would not impact aquatic organisms. In the event of non-routine in-water maintenance, Transco may need to excavate sediment in a localized area (e.g., potentially through the use of a suction dredge, divers using hand-jetting, or air-lifting equipment). The temporary displacement of these sediments would impact benthic and demersal species in the vicinity, but the impact would be relatively minor considering the small area affected and the long period of time between maintenance activities.

Operation of the Raritan Bay Loop would also affect aquatic organisms in the limited locations where the pipeline would be covered with concrete mattresses (i.e., at cable crossings where minimum burial depth cannot be achieved). The installation of exposed concrete mattresses (or mattresses with less than one foot of sediment cover) would have a long-term, minor, direct, adverse impact on organisms for species that are dependent on soft bottom habitats for survival. Long-term, minor, indirect and direct, beneficial impacts for species that inhabit hard bottom habitats could occur if these locations serve as artificial reef habitat.

4.5.3 Essential Fish Habitat

The MSA (16 USC § 1801 et seq.) was established, along with other goals, to promote the protection of EFH in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. EFH is defined in the MSA as those waters (e.g., aquatic areas and their associated physical, chemical, and biological properties used by fish) and substrate (e.g., sediment, hard bottom, underlying structures, and associated biological communities) necessary for the spawning, feeding, or growth to maturity of managed fish species. Managed species include marine, estuarine, and anadromous finfish; mollusks; and crustaceans.

Federal agencies that authorize, fund, or undertake activities that may adversely impact EFH must consult with the NMFS. Pursuant to the Fish and Wildlife Coordination Act, consultation is also necessary if a proposed activity may adversely impact other NOAA Trust Resources such as anadromous fish, crustaceans, shellfish, and/or their habitats. Although absolute criteria have not been established for conducting EFH consultations, the NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes, such as NEPA or the ESA, to reduce duplication and improve efficiency. Generally, the EFH consultation process includes the following steps:

1. Notification – The action agency should clearly state the process being used for EFH consultations (e.g., incorporating EFH consultation into an EIS).

2. EFH Assessment – The action agency should prepare an EFH Assessment that includes both identification of affected EFH and an assessment of impacts. Specifically, the EFH Assessment should include the following:

   - a description of the proposed action.

   - an analysis of the effects (including cumulative effects) of the proposed action on EFH, managed fish species, and major prey species.

   - the federal agency’s views regarding the effects of the action on EFH.

   - proposed mitigation, if applicable.

3. EFH Conservation Recommendations – After reviewing the EFH Assessment, NMFS should provide recommendations to the action agency regarding measures that can be taken by that agency to conserve EFH.

4. Agency Response – Within 30 days of receiving the recommendations, the action agency must respond to NMFS. The action agency may notify NMFS that a full response to the conservation recommendations would be provided by a specified completion date agreeable to all parties. The response must include a description of measures proposed by

> the agency to avoid, mitigate, or offset the impact of the activity on EFH. For any conservation recommendation that is not adopted, the action agency must explain its reason to NMFS for not following the recommendation.

We have reviewed the information submitted by Transco and performed our own research. Our analysis of the potential for the Project to impact EFH and NOAA Trust Resources is provided in this final EIS. We propose to consolidate EFH consultations for the NESE Project with the interagency coordination procedures required under NEPA. By letter dated March 23, 2018, we requested that the NMFS consider the draft EIS as the EFH Assessment for the Project. On May 14, 2018, the NMFS Habitat Conservation Division responded to our EFH consultation with 10 conservation recommendations, which we addressed in a response letter dated June 12, 2018. These conservation measures are discussed in section 4.5.3.3 below. This final EIS has been updated as appropriate relative to the NMFS' recommended conservation measures. Therefore, we conclude that EFH consultation under the MSA is complete.

4.5.3.1 Managed Fish Species and Essential Fish Habitat

The proposed NESE Project would cross tidally influenced waterways/waterbodies, estuarine waters, and open marine waters that could harbor EFH species and other NOAA Trust Resources. The onshore Madison Loop would cross two tidally influenced waterways, (Crossway Creek (WW-RS-005) and an unnamed tributary to Cheesequake Creek (WW-T01-004); and one tidal waterbody (WB-T01-001), which is a small open water embayment that houses a boat marina at approximately MP 11.7 (Lockwood Boat Works Marina). Transco also proposes to obtain water for hydrostatic testing from waterbody WB-T01-001. The unnamed tributary to Cheesequake Creek (WW-T01-004) would be crossed via the dry open cut crossing method, and the two remaining waterways/waterbodies would by crossed by HDD and would not be directly affected by the Project. The Project workspace also lies adjacent to a second tidally influenced waterway (WW-T07-001). All four of these features are unimpeded, tidally influenced, and federally regulated waters of the United States. The workspaces for the Madison Loop would also cross four delineated tidally influenced wetlands. The onshore portion of the Raritan Bay Loop would not cross any tidally influenced waterways, waterbodies, or wetlands. The offshore portion of the Raritan Bay Loop would cross a continuous expanse of open marine and estuarine waters in New Jersey and New York, consisting of three major waterbodies: Raritan Bay, Lower New York Bay, and the Atlantic Ocean.

EFH is designated for 33 species in the Project area. Information on these species and the EFH characteristics associated with their various life stages is provided in table 4.5.3-1.

None of the managed species with EFH in the Project area are listed as endangered or threatened under the ESA. However, Atlantic bluefin tuna, dusky shark, and sand tiger shark are listed as Species of Concern by the NMFS.

For certain species with EFH designations, areas termed Habitat Areas of Particular Concern (HAPCs) have also been identified. HAPCs either play important roles in the life history of managed species or are particularly vulnerable to degradation. No HAPCs are designated within the Project area.

TABLE 4.5.3-1

Designated Essential Fish Habitat for the Northeast Supply Enhancement Project Area

Species	Life Stage	Essential Fish Habitat Characteristics
Atlantic bluefin tuna (*Thunnus thynnus*)	Juveniles	Epipelagic waters off North Carolina to Cape Cod; species often occurs over the continental shelf and in embayments, especially during the summer months
Atlantic butterfish (*Peprilus triacanthus*)	Eggs	Surface waters from continental shelf into estuaries and bays; to about 197 feet (60 meters) deep in shelf waters; high salinity zone of estuaries and bays; 55–72.5 degrees Fahrenheit (°F) (12.8–22.5 degrees Celsius (°C)); 25–33 parts per thousand (ppt)
	Juveniles	Surface waters over continental shelf; into coastal bays and estuaries; common in inshore areas, including the surf zone, and in high salinity and mixed salinity zones of bays and estuaries; 39.9–85.4 °F (4.4–29.7 °C); 3.0–37.4 ppt
	Adults	Surface waters to 886–1,378 feet (270–420 meters) deep over continental shelf; into coastal bays and estuaries; common in inshore areas, including the surf zone, and in high salinity and mixed salinity zones of bays and estuaries; schools found over sandy, sandy-silt, and muddy substrates; 39.9–78.8 °F (4.4–26.0 °C); 3.8–33.0 ppt
Atlantic cod (*Gadus morhua*)	Adults	Bottom habitats with a substrate of rocks, pebbles, or gravel; <50 °F (10 °C); 33–492 feet (10–150 meters); wide range of oceanic salinities
Atlantic herring (*Clupea harengus*)	Larvae	Pelagic waters; <60.8 °F (16 °C); 164–295 feet (50–90 meters); 32 ppt
	Juveniles	Pelagic waters and bottom habitats; <50 °F (10 °C); 49–443 feet (15–135 m); 26–32 ppt
	Adults	Pelagic waters and bottom habitats; <50 °F (10 °C); 67–427 feet (20–130 meters); >28 ppt
Atlantic mackerel (*Scomber scombrus*)	Eggs	Pelagic habitats in inshore estuaries and embayments and on the continental shelf, generally found over bottom depths of <328 feet (100 meters); 43.7–54.5 °F (6.5–12.5 °C)
	Larvae	Pelagic habitats in inshore estuaries and embayments and on the continental shelf, generally found over bottom depths of 69–328 feet (21–100 meters); 41.9–52.7 °F (5.5–11.5 °C)
	Juveniles	Pelagic habitats in inshore estuaries and embayments and on the continental shelf, generally found over bottom depths of 33–361 feet (10–110 meters); 41–68 °F (5–20 °C)
	Adults	Pelagic habitats in inshore estuaries and embayments and on the continental shelf, generally found over bottom depths of <558 feet (170 meters); 41–68 °F (5–20 °C)
American plaice (*Hippoglossoides platessoides)*	Larvae	Surface waters; <57.2 °F (14 °C), 98–426 feet (30–130 meters); wide range of salinities
	Juveniles	Bottom habitats with a substrate of fine-grained sediment, sand, or gravel; <62.6 °F (17 °C), 148–492 feet (45–150 meters); wide range of salinities
	Adults	Bottom habitats with a substrate of fine-grained sediment, sand, or gravel; <62.6 °F (17 °C), 148–574 feet (45–175 meters); wide range of salinities
Black sea bass (*Centropristis striata*)	Juveniles	Offshore, demersal waters over the continental shelf; inshore, the estuaries where common, abundant, or highly abundant in the "mixing" and "seawater" salinity zones; >43 °F (6.1 °C); >18 ppt; usually found in association with rough bottom, shellfish and eelgrass beds, and man-made structures in sandy-shelly areas
	Adults	Offshore, demersal waters over the continental shelf; inshore, estuaries where common, abundant, or highly abundant for the "mixing" and "seawater" salinity zones; >43 °F (6.1 °C); structured habitats (natural and man-made), sand and shell substrate
Bluefish (*Pomatomus saltatrix*)	Eggs	Pelagic waters over the continental shelf at mid-shelf depths, excluding inshore waters; >64 °F (17.7 °C); >31 ppt
	Larvae	Pelagic waters over the continental shelf, most commonly above 49 feet (15 meters), excluding inshore waters; >64 °F (17.7 °C); >30 ppt
	Juveniles	Pelagic waters over the continental shelf; major estuaries
	Adults	Pelagic waters over the continental shelf; major estuaries; >25 ppt

TABLE 4.5.3-1 (cont'd)

Designated Essential Fish Habitat for the Northeast Supply Enhancement Project Area

Species	Life Stage	Essential Fish Habitat Characteristics
Clearnose skate (*Raja eglanteria*)	Eggs	There is no information available on the habitat associations or distribution of the egg stage for this species
	Juveniles	Bottom habitats with a substrate of soft, rocky, or gravelly bottom along the continental shelf; shore to 1,640 feet (500 meters), but most abundant <364 feet (111 meters) deep; 48.2–86 °F (9–30 °C)
	Adults	Bottom habitats with a substrate of soft, rocky, or gravelly bottom along the continental shelf; shore to 1,312 feet (400 meters), but most abundant <364 feet (111 meters) deep; 48.2–86 °F (9–30 °C)
Cobia (*Rachycentron canadum*)	All Life Stages	Sandy shoals of capes and offshore bars, high-profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum;* all coastal inlets; all state-designated nursery habitats of particular importance to coastal migratory pelagics; high salinity bays, estuaries, and seagrass habitats.
Dusky shark (*Carcharhinus obscurus*)	Neonates	Areas along the Atlantic east coast of Florida to the mid-coast of Georgia; South Carolina to southern Cape Cod; nursery areas in coastal waters
	Juveniles and Adults	Atlantic east coast of Florida, and South Carolina to southern Cape Cod; inshore waters to the outer reaches of continental shelves
King mackerel (*Scomberomorus cavalla*)	All Life Stages	Sandy shoals of capes and offshore bars, high-profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum;* all coastal inlets; all state-designated nursery habitats of particular importance to coastal migratory pelagics
Little skate (*Raja erinacea*)	Juveniles	Bottom habitats with a sandy or gravelly substrate or mud; from shore to 449 feet (137 meters) deep, with the highest abundance from 240–299 feet (73–91 meters); 39.2–59 °F (4–15 °C)
	Adults	Bottom habitats with a sandy or gravelly substrate or mud; from shore to 449 feet (137 meters) deep, with the highest abundance from 240–299 feet (73–91 meters); 35.6–59 °F (2–15 °C)
Longfin inshore squid (*Doryteuthis pealeii*)	Eggs	Inshore and offshore bottom habitats; 50–73.4 °F (10–23 °C), 30–32 ppt; <164 feet (50 meters) deep; egg masses are demersal and anchored to a variety of hard bottom types (e.g., shells, lobster pots, piers, fish traps, boulders, and rocks), submerged aquatic vegetation, sand, and mud.
	Juveniles	Pelagic habitats in inshore and offshore continental shelf waters and in embayments; 20–525 feet (6–160 meters); 47.3–76.1 °F (8.5–24.5 °C); 28.5–36.5 ppt
	Adults	Pelagic habitats in inshore and offshore continental shelf waters and in embayments; 20–656 feet (6–200 meters); 47.3–57.2 °F (8.5–14 °C); 24–36.5 ppt
Monkfish (*Lophius americanus*)	Eggs	Surface waters; <64.4 °F (18 °C); 49–3,280 feet (15–1,000 meters)
	Larvae	Pelagic waters; <59 °F (15 °C); 82–3,280 feet (25–1,000 meters)
Ocean quahog (*Arctica islandica*)	Adults	Throughout the substrate, to a depth of three feet below the water/sediment interface; water depths of 30–800 feet (9–244 meters); <60 °F (15.5 °C)
Red hake (*Urophycis chuss*)	Eggs	Surface waters of continental shelf; <50 °F (10 °C); <25 ppt
	Larvae	Surface waters; <66 °F (18.8 °C); >0.5 ppt; <656 feet (200 meters)
	Juveniles	Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops; <61 °F (16.1 °C); 31–33 ppt; <328 feet (100 meters)
	Adults	Bottom habitats in depressions with a substrate of sand and mud; <53.6 °F (12 °C); 33–34 ppt; 33–427 feet (10–130 meters)
Sand tiger shark [b] (*Carcharias taurus*)	Neonates	Along the Atlantic east coast from northern Florida to Cape Cod
Sandbar shark (*Carcharhinus plumbeus*)	Juveniles	Localized areas along the Atlantic coast of Florida, South Carolina, and southern North Carolina, and from Cape Lookout to southern New England; most common in 67–180 feet (20–55 meters) of water, but occasionally found at depths of about 656 feet (200 meters)
	Adults	Atlantic coastal areas from Florida to southern New England; most common in 67–180 feet (20–55 meters) of water, but occasionally found at depths of about 656 feet (200 meters)

TABLE 4.5.3-1 (cont'd)

Designated Essential Fish Habitat for the Northeast Supply Enhancement Project Area

Species	Life Stage	Essential Fish Habitat Characteristics
Scup (*Stenotomus chrysops*)	Eggs	Estuaries where common, abundant, or highly abundant in the "mixing" and "seawater" salinity zones; 55.4–73.4 °F (13–23 °C); >15 ppt
	Larvae	Estuaries where common, abundant, or highly abundant in the "mixing" and "seawater" salinity zones; 55.4–73.4 °F (13–23 °C); >15 ppt
	Juveniles	Offshore, demersal waters over the continental shelf; inshore, estuaries where common, abundant, or highly abundant in the "mixing" and "seawater" salinity zones in association various sands, mud, mussel, and eelgrass bed type substrates; >45 °F (7.2 °C); >15 ppt
	Adults	Offshore, demersal waters over the continental shelf; inshore, estuaries where common, abundant, or highly abundant in the "mixing" and "seawater" salinity zones; >45 °F (7.2 °C)
Shortfin mako shark (*Isurus oxyrinchus*)	All Life Stages	In the Atlantic, localized areas off Florida, South Carolina, and Maine, and from Cape Lookout though southern New England; warm and warm-temperate oceanic waters
Silver hake (whiting) (*Merluccius bilinearis*)	Eggs	Surface waters; <68 °F (20 °C); 164–492 feet (50–150 meters)
	Larvae	Surface waters; <68 °F (20 °C); 164–427 feet (50–130 meters)
	Juveniles	Bottom habitats of all substrate types; <69.8 °F (21 °C); 67–889 feet (20–270 meters); >20 ppt
	Adults	Bottom habitats of all substrate types; <71.6 °F (22 °C); 98–1,066 feet (30–325 meters)
Skipjack tuna [b] (*Katsuwonus pelamis*)	Adults	In the Atlantic, localized areas off of South Carolina and the northern east coast of Florida, from Cape Hatteras to Cape Cod, and the southern east coast of Florida through the Florida Keys
Smooth dogfish (*Mustelus canis*)	All Life Stages	Primarily inshore, demersal waters to 656 feet (200 meters)
Spanish mackerel (*Scomberomorus maculatus*)	All Life Stages	Sandy shoals of capes and offshore bars, high-profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum;* all coastal inlets; all state-designated nursery habitats of particular importance to coastal migratory pelagics
Spiny dogfish (*Squalus acanthias*)	Sub-Adult Females	Pelagic and epibenthic habitats; wide depth range; 32–35 ppt; 44.6–59 °F (7–15 °C)
	Adults	Pelagic and epibenthic habitats; wide depth range; 32–35 ppt; 44.6–59 °F (7–15 °C)
Summer flounder (*Paralichthys dentatus*)	Larvae	Pelagic waters over the continental shelf; inshore, estuaries where present in the "mixing" and "seawater" salinity zones; most abundant nearshore at depths 30–230 feet (9–70 meters)
	Juveniles	Demersal waters over the continental shelf; inshore, estuaries (salt marsh creeks, seagrass beds, mudflats, and open bay areas) where present in the "mixing" and "seawater" salinity zones; >37 °F (2.7 °C); 10–30 ppt
	Adults	Demersal waters over the continental shelf; inshore, estuaries where present in the "mixing" and "seawater" salinity zones; generally inhabit shallow coastal and estuarine waters during warmer months and moved offshore to depths of 500 feet (152 meters) in colder months
Tiger shark (*Galeocerdo cuvier*)	Juveniles	Atlantic east coast from Florida to New England; warm waters in both deep oceanic and shallow coastal regions; warm waters in both deep oceanic and shallow coastal regions
Windowpane flounder (*Scophthalmus aquosus*)	Eggs	Surface waters; <68 °F (20 °C); <230 feet (70 meters)
	Larvae	Pelagic waters; <68 °F (20 °C); <230 feet (70 meters)
	Juveniles	Bottom habitats with a substrate of mud or fine-grained sand; <77 °F (25 °C); 3–328 feet (1–100 meters); 5.5–36 ppt
	Adults	Bottom habitats with a substrate of mud or fine-grained sand; <80.2 °F (26.8 °C); 3–246 feet (1–75 meters); 5.5–36 ppt

TABLE 4.5.3-1 (cont'd)

Designated Essential Fish Habitat for the Northeast Supply Enhancement Project Area

Species	Life Stage	Essential Fish Habitat Characteristics
Winter flounder (*Pseudopleuronectes americanus*)	Eggs	Bottom habitats with a substrate of sand, muddy sand, mud, and gravel; <50 °F (10 °C); 10–30 ppt; <16 feet (5 meters)
	Larvae	Pelagic and bottom waters; <59 °F (15 °C); 4–30 ppt; <20 feet (6 meters)
	Juveniles	Bottom habitats with a substrate of mud or fine grained sand; <77 °F (25 °C); 10–30 ppt; 3–164 feet (1–50 meters)
	Adults	Bottom habitats, including estuaries, with substrate of mud, sand, gravel; <77 °F (25 °C); 15–33 ppt; 3–328 feet (1–100 meters)
Winter skate (*Leucoraja ocellata*)	Juveniles	Bottom habitats with a substrate of sand and gravel or mud; shoreline to about 1,312 feet (400 meters) deep, but most abundant at <354 feet (111 meters); 29.8–69.8 °F (-1.2–21 °C) with most found from 39.2–60.8 °F (416 °C), depending on the season
	Adults	Bottom habitats with a substrate of sand and gravel or mud; shoreline to 1,217 feet (371 meters) deep, but most abundant <364 feet (111 meters); 29.8–68°F (-1.2–20 °C), with most found from 41–59 °F (5–15 °C), depending on the season.
Witch flounder (*Glyptocephalus cynoglossus*)	Larvae	Surface waters to 820 feet (250 meters); <55.4 °F (13 °C); deep water with high salinities
Yellowtail flounder (*Limanda ferruginea*)	Eggs	Surface waters; <59 °F (15 °C); 98–295 feet (30–90 meters); 32.4–33.5
	Larvae	Surface waters; <62.6 °F (17 °C); 33–295 feet (10–90 meters); 32.4–33.5 ppt

[a] Area of analysis is within five distinct 10-minute square boundaries:

40º 40.0' N, 73º 50.0' W, 40º 30.0' N, 74º 00.0' W, which includes Atlantic Ocean waters partly within the Hudson River estuary affecting the following: western Rockaway Beach, western Jamaica Bay, Rockaway Inlet, Barren Island, Coney Island except for Norton Point, Paerdegat Basin, Mill Basin, southwest of Howard Beach, Ruffle Bar, and many smaller Islands.

40º 30.0' N, 73º 50.0' W, 40º 20.0' N, 74º 00.0' W, which includes the waters both west of and east of the northern majority of Sandy Hook Peninsula. Also includes waters east of Sea Bright, New Jersey, and north of Monmouth, New Jersey, and waters within the eastern half of the Shrewsbury River and the very eastern portion of the Navesink River.

40º 30.0' N, 74º 10.0' W, 40º 20.0' N, 74º 20.0' W, which includes the waters within the square south and west of Staten Island, within the southwestern part of Raritan Bay.

40º 40.0' N, 74º 00.0' W, 40º 30.0' N, 74º 10.0' W, which includes Atlantic Ocean waters within the Hudson River estuary affecting the following: Staten Island, from Port Richmond, New York, on the northwest around to Great Kills South Harbor of Great Kills, New York,, south of Bayonne, New York.

40º 40.0' N, 74º 10.0' W, 40º 30.0' N, 74º 20.0' W, which includes Atlantic Ocean waters within the Hudson River estuary affecting the following: Staten Island, from Port Richmond, New York, on the northeast around to Great Kills South Harbor of Great Kills, New York, south of Bayonne, New York.

[b] EFH for this species is not crossed by the Raritan Bay Loop, but the species has EFH designated in the immediate vicinity of the Project area.

Source: NMFS EFH Mapper online tool and associated source documentation.

In addition to the EFH species in table 4.5.3-1 above, other non-EFH NOAA Trust Resources may be affected by the proposed Project. Based on Transco's consultation with the NMFS and our own research, we have identified 16 additional NOAA Trust Resource species that could be adversely affected the proposed Project. These species and their general habitat characteristics are summarized in table 4.5.3-2. Some of these species are also discussed in more detail in section 4.5.2.4.

TABLE 4.5.3-2 **Non-EFH NOAA Trust Resources in the Northeast Supply Enhancement Project Area**	
Species	Habitat Characteristics
Alewife (*Alosa pseudoharengus*)	Species spawns in coastal streams and tributaries, with peak spawning occurring over the course of three to four weeks between April and June. Eggs are pelagic and are known to settle onto all substrate types in Lower New York Bay and Raritan Bay from April through June. In spring and early summer, juveniles are typically found in estuarine and tidal freshwater habitats (FWS, 2001), moving downstream into freshwater tributaries and river ends in the late summer as water temperatures drop (ASMFC, 2013b).
American eel (*Anguilla rostrata*)	Species is catadromous, spending the majority of its life history in freshwater and estuarine environments before migrating to offshore spawning grounds to reproduce and die (ASMFC, 2018a). Juveniles occur at all depths, but typically burrow in mud in the daytime or winter and are commonly associated with eelgrass and sandy bottom sediment. Adults are found in a wider range of depths and habitats (Tanski et al., 2014).
American lobster (*Homarus americanus*)	Coastal populations of this species generally prefer habitats with available shelter such as rocks and debris, though they can also be found burrowed in mud substrates, sand, and on vegetated bottoms (Tanski et al., 2014).
American shad (*Alosa sapidissima*)	Species migrates through Lower New York Bay and Raritan Bay in the spring to spawn in fresh waters within the Hudson River (New Jersey Sea Grant Consortium, 2018a; Kahnle and Hattala, 2010). Juveniles generally prefer cool, high salinity waters and often remain in the Hudson Estuary until the fall, then migrate to the ocean (New Jersey Sea Grant Consortium, 2018a). Adults spend a majority of their lives offshore (ASMFC, 2018b).
Atlantic menhaden (*Brevoortia tyrannus*)	Juvenile habitat is unconsolidated bottom consisting mostly of sand and mud, with various mixtures of organic material in fresh and brackish-water estuaries (ASMFC, 2015a). Adult habitats include those with bottom compositions of sand, mud, organic material, and mud with rocks. Adults and juveniles form large, near-surface schools from early spring through early winter, primarily in estuaries and nearshore ocean waters. During fall/early winter, menhaden of all sizes and ages migrate southward toward North Carolina capes to spawn (ASMFC, 2018c).
Blackfish/Tautog (*Tautoga onitis*)	Species undertakes seasonal migrations between inshore and offshore habitats. In late fall, adults migrate to deep offshore wintering areas with rugged bottom topography. In the spring, adults generally migrate to spawn in estuaries and inshore marine waters. Juveniles and adults depend on shelter for protection, and thus require habitats with features such as rock reefs, rock outcrops, gravel, eelgrass beds, kelp, or sea lettuce beds. Species can be found near vegetation, rocks, natural and artificial reefs, jetties and groins, mussel and oyster beds, and similar complex, structured coastal habitats (ASMFC, 2015b).
Blue crab (*Callinectes sapidus*)	Species occupies a variety of habitats, including offshore, high-salinity waters in the early larval stages, intertidal marshes and soft-sediment shorelines as juveniles, and deeper offshore waters as adults (NOAA, 2017). During the late fall and winter, blue crabs become dormant and bury themselves in the sediments of the deeper portions of Raritan and Lower New York Bays (MacKenzie, 1990).
Blue mussel (*Mytilus edulis*)	Species typically prefers to attach to hard substrates such as gravel, shell beds, rocks, or submerged human structures (New Jersey Sea Grant Consortium, 2018b).
Blueback herring (*Alosa aestivalis*)	Species spawns in coastal streams and tributaries, with peak spawning occurring over the course of three to four weeks between April and June. Eggs are pelagic and are known to settle onto all substrate types in Lower New York Bay and Raritan Bay from April through June. In spring and early summer, juveniles are typically found in estuarine and tidal freshwater habitats (FWS, 2001), moving downstream into freshwater tributaries and river ends in the late summer as water temperatures drop (ASMFC, 2013b).
Eastern oyster (*Crassostrea virginica*)	Species is capable of surviving a variety of habitat conditions, but prefers depths of 2–16 feet (0.6–5 meters) in Mid-Atlantic waters. Larvae prefer clean hard substrate or shell substrate, and adults inhabit a variety of substrates including mud (Eastern Oyster Biological Review Team, 2007).
Hard clam (*Mercenaria mercenaria*)	Species prefers muddy bottoms in estuaries from the intertidal zone to a depth of 33 feet (10 meters) (FAO, 2018).
Horseshoe crab (*Limulus polyphemus*)	Species spawns along sandy shorelines of the New York–New Jersey Harbor Estuary during the full moon in May or June (Antonucci et al., 2014). Larvae can be found in the water column July through September (Tanski et al., 2014). For the first few years of their life, juvenile horseshoe crab inhabit tidal flats and nearshore areas and move farther from shore as they get older (ASMFC, 2017a; FWS, 2006a). Adults migrate to deep bay waters and offshore for wintering (ASMFC, 2017a; FWS, 2006a).
Soft clam (*Mya arenaria*)	Adults burrow into the sediment of sandy, sand-mud, or sandy-clay substrates of bays and inlets. Densities are typically highest within a depth range of 10–13 feet (3–4 meters) (Abraham and Dillon, 1986).

TABLE 4.5.3-2 (cont'd) **Non-EFH NOAA Trust Resources in the Northeast Supply Enhancement Project Area**	
Species	Habitat Characteristics
Striped bass (*Morone saxatilis*)	Species typically resides in offshore Atlantic waters, moving inshore to the Hudson River, Delaware River, and Chesapeake Bay to spawn. Adult striped bass are found in the Hudson River and Estuary from late March to early June, moving through Lower New York Bay and Raritan Bay before and after spawning (New Jersey Sea Grant Consortium, 2018c). Juveniles typically prefer clean, sandy bottom in shallow water, and have also been found over gravel, and sand/gravel/rock mixtures (ASMFC, 2018d). Adult habitats include sandy beaches, rocky shores, the surf zone, areas hollowed out by wave action, around sand bars, and under rafts of floating seaweed.
Surf clam (*Spisula solidissima*)	Species is oceanic and most common in turbulent areas ranging from 26–216 feet (8–66 meters) deep (NMFS, 1999). Adults burrow in medium to coarse sand and gravel and silty to fine sand.
Weakfish (*Cynoscion regalis*)	Species is typically found in estuaries or coastal margins, preferring both deep channels and shallow habitats. Juvenile weakfish inhabit sand or sand/seagrass habitats in the deeper waters of bays, estuaries, and sounds, as well as the nearshore Atlantic Ocean (ASMFC, 2015c). Adults migrate northward and inshore in the spring, and southward and offshore in the fall.

4.5.3.2 Assessment of Potential Impacts on Essential Fish Habitat and NOAA Trust Resources

Many of the potential impacts on EFH and NOAA Trust Resources would be the same as those discussed for fish, shellfish, and benthic communities in section 4.5.2.8. Fish species listed under the ESA (Atlantic sturgeon and shortnose sturgeon) are discussed in section 4.6.3.5. Additional discussion of EFH-related impacts and mitigation is provided below.

Timing of Construction

The season in which construction takes place can influence the degree of impacts associated with construction activities. Construction during periods of sensitive fish activity (e.g., spawning, migration) could cause greater impacts than construction during other periods. Construction of the offshore pipeline is expected to last up to 9 months, with offshore construction activities potentially occurring 24 hours a day, 7 days a week.

Transco plans to minimize potential impacts on winter flounder EFH by avoiding sediment-disturbing activities during the December 15 to May 31 spawning season in areas of Raritan Bay and Lower New York Bay that are shallower than the 20-foot bathymetric contour (MPs 12.0 to 30.7). Transco would also implement a 500-foot buffer seaward of the 20-foot contour to minimize the potential impacts of sediment transport beyond the offshore workspace. The NYSDEC has preliminarily indicated that the time of year restriction could start on January 1 instead of December 15 for backfilling activities. Transco will continue to consult with the NMFS and the NYSDEC regarding construction methods and time of year restrictions for winter flounder.

To minimize potential sensory impacts of construction on river herring (i.e., alewife and blueback herring) during their peak spawning migration, Transco would restrict dredging and pile driving activities from December 15 through May 31 between MPs 12.0 and 15.5. The NMFS recommended a time of year restriction for river herring of March 1 to June 30, but Transco is requesting modification to this schedule (see table 4.5.2-7) and will continue to consult with NMFS about this potential change. The NMFS and the NYSDEC have preliminarily indicated that they would allow a start date for June 1 for activities between MPs 12.5 and 15.3.

To minimize potential impacts on blue crab, construction of the Raritan Bay Loop would be restricted from December 1 through April 30 within a 500-foot buffer around the Ambrose Channel and the Chapel Hill Channel (excluding Richmond County, where dredge harvest of crabs is prohibited).

Alternatively, the NYSDEC and the NMFS have preliminarily indicated that Transco could continue construction in New York waters during this period if a 30-day notice is given to registered harvesters. Transco will continue to consult with the NJDEP and the NMFS about blue crab timing restrictions in New Jersey waters.

The NJDEP recommended that no construction activities take place nearshore or offshore between April 15 and September 15 to avoid impacts on horseshoe crab. However, given the time of year restrictions for other sensitive species, May to September is the only feasible time period for Transco to construct the Raritan Bay Loop. As such, Transco has requested that construction activities be allowed near the Morgan shore during the recommended horseshoe crab time of year restriction (see table 4.5.2-7) and will continue to consult with the NJDEP about this request. Transco has not proposed species-specific mitigation measures for horseshoe crab, but potential impacts would be reduced by Transco's effort to minimize seafloor disturbance to the extent practicable, the implementation of best management practices during construction (e.g., use of an environmental bucket during all clamshell dredging), and backfilling with clean material where necessary. Transco will continue to consult with the NJDEP, NYSDEC, and the NMFS regarding additional feasible measures to reduce Project-related impacts on horseshoe crab.

Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during the timing restriction windows, and has requested modification to some of the timing restrictions due to construction schedule constraints (see table 4.5.2-7). Because the various timing restrictions for minimizing impacts on fisheries resources have not been finalized, we have recommended in section 4.5.2.8 that Transco provide documentation of agency approval for timing restrictions and allowable work prior to construction.

Sedimentation and Turbidity

Construction of the pipeline would directly disturb approximately 87.8 acres of ocean floor. This estimate includes direct impacts on the seafloor from mechanical activities (e.g., pipeline installation), vessel mooring systems/anchor placement, temporary piles, and entry/exit excavations for HDD operations. In total, an estimated 1,091,734 cubic yards of sediment would be dredged or otherwise disturbed (i.e., jetted) during the offshore pipeline installation, including HDD pit excavations.

As described in section 4.5.2.8, Transco conducted hydrodynamic and sediment transport modeling to assess the potential effects of the Project on turbidity and the redistribution of sediments. Sediment sampling and sediment transport modeling reports prepared by Transco are summarized in table 4.5.2-3. Several model simulations were run to evaluate the concentrations of suspended sediments, spatial extent and duration of sediment plumes, and the seafloor deposition resulting from each of the sediment-disturbing construction and backfilling activities. This modeling indicates that an additional 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediments disturbed by the offshore construction activities.

Construction-related sediment resuspension and turbidity could result in temporary, minor, indirect and direct, adverse impacts on EFH species and NOAA Trust Resources. The level of impact is dependent on interactions between a variety of dynamic and complex factors such as sediment quality, grain size, water temperature, duration and frequency of exposure, species life stage and life history, season, physical condition of biota, refugia/habitat availability, etc. In general, benthic species are more tolerant of suspended sediments than pelagic species (Kjelland et al., 2015).

Increases in turbidity can affect fish physiology and/or behavior. Potential physiological effects include mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, and interference with respiratory functions. Possible behavioral effects from increased turbidity include interference with feeding for sight-foraging fish and area avoidance. In addition to the physiological and behavioral effects, turbidity tends to interfere with light penetration and thus reduces photosynthetic activity by phytoplankton. Such reductions in primary production would be localized around the immediate area of the dredging, jetting, and backfilling operations and would be limited to the duration of the sediment plume. Excessive nutrient loading resulting from suspension of sediments can have the opposite effect, causing a dramatic increase in the productivity of planktonic algal populations. Eggs and larvae are the life stages that are most likely to be directly affected by a temporary increase in turbidity and potential decrease in dissolved oxygen concentrations. These life stages are more sensitive and are unable to move from the affected areas and, therefore, would be more susceptible to impacts compared to juveniles and adults. Many of the EFH species in the Project area have demersal egg and/or larval stages that settle onto the bottom and are thus particularly susceptible to turbidity-related impacts. Previous experiments have shown that a viable hatch of winter flounder eggs is reduced when the eggs are buried by as little as one half of one egg diameter, approximately 0.05 centimeter of sediment (Berry et al., 2003). In other laboratory experiments, winter flounder eggs were found to be affected by a sedimentation level of 0.065 centimeter, and almost complete mortality was observed for deposition of more than 0.25 centimeter (Berry et al., 2011). As summarized in table 4.5.2-6, up to 573.3 acres of shallow bay waters (less than 20 feet mean lower low water) could be subject to sedimentation greater than 0.3 centimeter at various points during Project construction.[26] The acreage affected by sedimentation greater than 0.05 centimeter would be even larger. Winter flounder eggs could be affected by construction of the Project if sedimentation is experienced in these shallow waters during the spawning period. As mentioned above, Transco plans to minimize potential impacts on winter flounder EFH by avoiding sediment-disturbing activities during the December 15 to May 31 spawning season in areas of Raritan Bay and Lower New York Bay that are shallower than the 20-foot bathymetric contour. Transco would also implement a 500-foot buffer seaward of the 20-foot contour to minimize the potential impacts of sediment transport beyond the offshore workspace. Transco is continuing to consult with the NMFS and the NYSDEC about possible modifications to this timing restriction window and/or allowable work during the timing restriction window.

Given the high natural mortality from egg to larvae to adult, adverse effects of burial at the population level are expected to be minor and only measurable in the immediate vicinity of the construction workspace. Some demersal fish that are adapted to higher turbidity environments could be drawn to the sediment-generating activities as a source of food, but mobile juvenile and adult pelagic species with EFH in the Project area would likely temporarily leave the construction area to avoid sediment plumes. However, the feeding ability of some filter-feeding shellfish species could be adversely affected by the increase in sediment in the water column. Given the relatively short duration of sediment-disturbing activities and rapid pace at which resuspended sediments are expected to settle out of the water column, impacts of sedimentation and turbidity on EFH species and other NOAA Trust Resources are anticipated to be temporary and minor.

Resuspension of Contaminated Sediments

Temporary, minor, direct, and indirect adverse impacts on EFH species and other NOAA Trust Resources could occur from the resuspension of contaminated sediments during construction, potentially resulting in exposure of biota within the water column. The resuspension of contaminated sediments could affect habitat quality for species in the Project area. Aquatic organisms can be exposed to resuspended contaminants via ingestion with food, through membrane-facilitated transport, or passive diffusion

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[26] This acreage total is based on a sum of the estimated impact acreage for each individual construction activity/ location. In locations where the same area of seafloor is affected by sediment deposition from more than one construction activity, the acreage total is cumulative. In the event that more than one construction activity affects the same area concurrently, total acreage affected would be overestimated.

(Eggleton and Thomas, 2004). Contaminant uptake mechanisms and rates vary among and within species, life stage, season, behavior, reproductive status, and history of previous exposure. In addition to direct toxic effects, marine organisms can accumulate chemicals in their body tissues. The magnitude of this bioaccumulation can vary widely depending on the chemical and its properties. For chemicals that are persistent and dissolve poorly in water, chemical concentrations in contaminated fish and shellfish might be several orders of magnitude higher than their concentrations in water. This "biomagnification" occurs when chemical concentrations increase in aquatic organisms of each successive level of the food web due to increasing dietary exposures (e.g., increasing concentrations from algae, to zooplankton, to forage fish, to predator fish). Predator fish and humans can be indirectly exposed to these chemicals through exposure to the aquatic food web pathway. If sediment contaminants became bioavailable or biotransferred within food chains, indirect impacts would occur. To assess these risks, Transco conducted sediment sampling and sediment chemistry analysis along the proposed pipeline route in late 2016 and early 2017. Additional sediment sampling was conducted in 2018 to further assess the chemical characteristics of sediment within the Raritan Bay Channel and Chapel Hill Channel at deeper depths than previously sampled and to determine the suitability of sediments from the proposed clamshell dredging areas for offshore disposal at the HARS or at approved onshore facilities. As discussed in section 4.5.2.3, we consider the offshore sampling program conducted by Transco to be sufficient to characterize the chemical properties of sediments disturbed by construction and to evaluate the impact of suspension and redeposition of sediments on aquatic resources.

The laboratory analytical results of sediment samples obtained during the offshore sampling programs, as well as Transco's contaminant transport modeling results, are summarized in section 4.5.2.8. Contaminants that become resuspended during sediment-disturbing construction activities are expected to generally be adsorbed to organic material and fine-grained sediment, and redeposited as sediment-bound compounds, which would limit their bioavailability to aquatic organisms. Furthermore, the sediment transport modeling conducted by Transco indicated that contaminated sediment could be redistributed several hundred feet from source of the sediment disturbance, which would aid in the dilution of resuspended contaminants. The redeposited sediment is expected to be similar in contaminant concentration to the ambient conditions of the surface sediments at the depositional locations. The results of Transco's TBP modeling using maximum PCB concentrations measured along the offshore route (see section 4.5.2.8) suggest that the entrainment and redeposition of even the most contaminated sediments would not substantially adversely affect aquatic resources or food webs. Transco's contaminant transport modeling results also indicate that expected maximum concentrations would generally meet water quality standards at the edge of a 500-foot mixing zone. For some of the modeled scenarios, water quality standards for mercury and copper would not be met at the edge of the mixing zone, based on conservative rates of continuous dredging. In these areas, Transco would use dredging rates slower than 7,500 ft^3/hr as necessary, based on field monitoring, to help ensure compliance with the water quality standards for copper and for mercury at sites with Class C concentrations of mercury. Additionally, Transco would use an environmental bucket during all clamshell dredging (unless the environmental bucket encounters refusal due to hardpan or bedrock), and no barge scow overflow would occur in areas of elevated contaminants (e.g., NYSDEC Class C sediments). The NYSDEC has also indicated that monitoring of the water column for chemical contaminants, as well as turbidity, would be required in New York State to ensure compliance with state water quality standards. Transco is consulting with the NYSDEC to determine specific requirements and the extent of such monitoring, and Transco would comply with monitoring requirements set forth in the Project's NYSDEC Water Quality Certification. In summary, the release of sediment-bound contaminants could result in minor impacts on EFH species along the proposed pipeline route; however, these effects would be temporary and would subside upon completion of pipeline construction activities.

Loss/Reduction of Benthic Community Taxa

Direct impacts on the benthos from pipeline installation and other bottom-disturbing activities would result in short-term adverse effects on benthic invertebrates, with subsequent secondary adverse effects on EFH species through reduction of forage species. Direct impacts on benthic organisms would include crushing, localized disruption, removal, turn-over, and deposition of sediment. The potential for direct and indirect impacts on EFH species and NOAA Trust Resources in the Project area from benthic community disruption would differ from species to species depending on life history, habitat use, geographic distribution, and abundance.

When a benthic community is physically disturbed by dredging or smothering, the community can generally be expected to recolonize through natural succession in approximately 1 to 3 years, based on studies on benthic recovery (e.g., AKRF, Inc. et al., 2012; Germano et al., 1994; Hirsch et al., 1978; Kenny and Rees, 1994; LaSalle et al., 1991; Murray and Saffert, 1999; Newell et al., 1998; and Rhoades et al., 1978). This estimate represents what we would expect in areas affected by dredging or trenching as well as adjacent areas where redeposition of sediments would be thickest. Faster rates of recovery would likely occur in areas less affected by sedimentation. However, if the physical characteristics of the habitat are altered (e.g., sediment type, hydrology), resulting in recolonization of different species, benthic community recovery could take longer (Schaffner et al., 1996; Van Dolah et al., 1994; Wilber and Stern, 1992). Following completion of backfilling operations, Transco would conduct a hydrographic survey to verify that the contours of the seafloor have been restored, and would backfill as needed, in accordance with permit conditions. Transco anticipates that the hydrographic survey would be conducted within 30 days following the completion of all backfilling activities for the Raritan Bay Loop. We expect that affected benthic communities in the construction area would re-establish within a short time as native assemblages recolonize the affected area or a new community develops as a result of immigration of organisms from nearby areas or from larval settlement. Transco would also conduct an annual post-construction monitoring survey to ensure that adequate burial depth is maintained along the pipeline route. To verify benthic communities recover as expected, we have recommended that Transco file a 5-year post-construction benthic sampling and monitoring plan for the subsea pipeline (see section 4.5.2.8).

Noise

Noise generated by construction vessels, pile driving, and other construction activities could have temporary, minor, direct adverse impacts on EFH species and NOAA Trust Resources. Potential impacts of sound exposure on fish species could include temporary threshold shifts, physical damage, physiological stress responses, and behavioral responses such as startle response, alarm response, avoidance, and a potential lack of response due to masking of acoustic cues. Fish species with swim bladders are thought to be more susceptible to noise/pressure impacts. Most species in the Project area would be able to avoid areas of noise that would cause them discomfort or harm. Noise-related impacts on EFH species would be either temporary or intermittent and are not likely to cause population-level effects, though harassment or injury of individual fish is possible. Interim criteria for the onset of physical injury in fish are a peak sound pressure level exceeding 206 dB (re 1 μPa), or a sound exposure level, accumulated over all pile strikes generally occurring within a single day, exceeding 187 dB (re 1 $\mu Pa^2 \cdot sec$) for fishes 2 grams or larger, or 183 dB for smaller fishes (Stadler and Woodbury, 2009). To assess behavioral disturbance, the NMFS has adopted a threshold criterion of 150 dB (re 1 μPa RMS) for fish of all sizes (Andersson et al., 2007; Purser and Radford, 2011; Wysocki et al., 2007).

Transco estimates that Project-related construction vessels could generate underwater noise that peaks between 140 to 180 dB re 1 μPa at 3.3 feet at frequencies between 0.1 and 1 kHz (LGL and JASCO, 2005). Assuming a worst-case peak source level of 180 dB, Transco estimates that the noise generated by construction vessels could exceed the behavioral disturbance threshold for fish within approximately 83 feet from the source. However, as discussed in section 4.5.2.8, background noise in the underwater environment would be similar to the noise generated by the largest vessels used during construction of the Project. The noise generated by these vessels would be similar to the range of engine noise from existing ship traffic associated with the busy Port of New York and New Jersey. As such, we do not expect that the relatively small number of vessels associated with the Project would substantially affect the existing underwater noise environment. Therefore, noise associated with operation of construction vessels is not expected to adversely affect EFH species or other NOAA Trust Resources.

Transco expects that the jet trencher would produce sound levels up to 150 dB re 1 μPa at 6 to 10 feet from the source at start-up. After the jet trencher "swords" penetrate the seafloor, the noise would be dampened and is expected to drop to 110 dB re 1 μPa. Disturbance of fish species by jet trencher noise would be limited to within 10 feet from the jet trencher at start-up. Additionally, the jet trencher would advance at a rate of approximately 246 feet per hour such that vessel noise from this activity potentially exceeding 150 dB re 1 uPa RMS would affect a single location for less than a few hours. Hand jetting equipment operated at a pressure of 412 bar has been documented to produce sound levels between 135 dB and 171 dB re 1 μPa at approximately 3.3 feet from the source (Molvaer and Gjestland, 1981). Transco estimates that noise generated by hand jetting could exceed the 150 dB threshold within up to 77 feet from the source. The construction activity of greatest duration is the hand-jetting that would occur seaward of the Rockaway Peninsula at the Neptune Cable crossing (MP 35.2). Transco estimates that this activity would last for 279.2 hours (11.6 days), with multiple daily breaks for crew shift changes.

Transco proposes to install 163 temporary piles, of which 34 piles would be installed with a combination of diesel impact hammer and vibratory device and the remainder would be installed via vibratory device. Transco anticipates that the time needed to install one pile via vibratory device is approximately 15 minutes of continuous vibration. For impact hammer-driven piles, the anticipated driving time is approximately 38 to 62 minutes per pile, with approximately 3,382 strikes per pile at MP 29.4 of the Ambrose Channel HDD, and approximately 1,920 to 2,500 strikes per pile at other locations. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. The milepost, size, type, purpose, installation time and duration, and removal time and duration of all proposed piles are summarized in table 2.3.3-4. As discussed in section 4.5.2.8, the noise generated by pile driving (based on Transco's acoustic modeling results) would exceed both the injury and behavioral disturbance thresholds for fish. The 150 dB re 1 μPa behavioral disturbance threshold for fish would be exceeded up to 705 feet from the source for vibratory pile driving, and up to 32,808 feet (6.2 miles) from the source for impact pile driving. Pile driving would exceed the 206 dB re 1 μPa peak sound pressure injury threshold for fish within a limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving ranged from 3,271 to 7,037 feet (0.6 to 1.3 miles). An individual fish would need to remain within this area during the entire duration of the pile driving event to experience an injury. Additionally, these zones would be constricted by land, and some of the pile driving noise is likely to be masked by ambient noise at distances shorter than those predicted by the noise modeling. We have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce noise to acceptable levels (see section 4.5.2.8).

Release of HDD Drilling Fluid and Cuttings

Transco proposes to excavate pits at the offshore HDD exit/entry sites to collect and contain drilling fluid and cuttings during the HDD operation. Transco estimates that approximately 9,400 gallons of drilling fluid would be deposited in the Morgan Shore Approach HDD exit pit during drilling of the pilot hole, and an additional 1,070 cubic yards of combined drilling fluid and cuttings would be deposited in the pit during reaming, swabbing, and pullback operations. At the Ambrose Channel HDD, a total of approximately

689,000 gallons of drilling fluid would be deposited in the entry and exit pits during pilot hole drilling, and additional 14,300 cubic yards of combined drilling fluid and cuttings would be deposited in the pits during reaming, swabbing, and pullback operations. Transco designed the excavation dimensions of the offshore HDD pits such that they would be of sufficient size to contain the expected volume of drilling fluid and cuttings generated by HDD operations, plus 25 percent. Bentonite in the drilling fluid is expected to settle at the bottom of the HDD pits due to particle aggregation (flocculation) as the drilling fluid enters the marine environment (Berner and Berner, 1996; Middleton and Southard, 1977; Akther et al., 2008). Based on the cohesive properties of the drilling fluid in saltwater, the material is expected to remain stable at the bottom of the exit pit and not escape into the surrounding area. Following completion of the HDD activities, Transco would add a top layer of sediments over the drilling fluid and cuttings that collect within the offshore HDD pits both to cap these materials and restore the contours of the seafloor. The top layer additionally would facilitate recolonization of benthic species in this area.

Juvenile and adult finfish near the HDD pits would have enough mobility to avoid the areas of drilling fluid discharge. Additionally, because the drilling fluid is expected to remain in the HDD pits, pelagic or benthic species in areas outside the pits are not likely to be affected. Any demersal eggs or larvae that settle in the pit during construction likely would be smothered by the drilling fluid, resulting in their mortality, and recolonization of the pit by marine organisms would be inhibited prior to backfill.

To minimize the potential for toxic impacts on offshore resources, Transco proposes to use a NSF/ANSI-approved, water-based drilling fluid as opposed to petroleum-based mud systems that have been shown to have higher chronic toxicity effects (Cranford et al., 2001). The drilling fluid would contain additives that affect the properties of the fluid. Transco is working with its contractors to finalize the specific additives that would be used in HDD construction. The currently proposed HDD additives are MAX-GEL (bentonite), soda ash (sodium carbonate), Platinum Pac (polyanionic cellulose polymer), Duo-Vis/Super-Vis (biopolymer/xanthan gum), and Plugz-IT Max (silica and other non-hazardous minerals). Equivalent products from other vendors may be used as alternatives. Transco has filed the safety data sheets for these products and expects that the proposed HDD fluid would not result in adverse effects on aquatic organisms beyond the HDD entry and exits pits. The ecotoxicity of a majority of the additives typically used in HDD operations have been tested for one or more aquatic species and determined to be either not acutely toxic or slightly toxic. To ensure that the use of additives would not result in a significant impact on aquatic resources, Transco has committed to file with the Secretary a complete HDD fluid effect assessment with the Implementation Plan for the Project. This would be reviewed and approved by the Director of OEP prior to the use of drilling fluid additives in HDD construction.

Although the drilling fluid would consist of non-toxic materials, such as bentonite clay and water, the inadvertent release of large quantities of drilling fluid into the water column could adversely affect EFH and other NOAA Trust Resources. Due to flocculation of the bentonite clay particles upon entering seawater, the plume would be expected to settle quickly; however, if sufficient current velocities were present, the particles could become entrained in the water column and transported to other locations, causing turbidity and sedimentation. Although bentonite by itself is non-toxic, it is a fine particulate material that could interfere with oxygen exchange by the gills of marine organisms and smother benthic organisms (including benthic eggs and larvae). Impacts would be localized and would generally be limited to individual fish and invertebrates in the immediate vicinity of the release. The majority of highly mobile organisms would be able to avoid or move away from the affected area. Other less mobile or immobile organisms could be harmed or killed. Based on the subsurface conditions encountered in the geotechnical investigations carried out by Transco, the risk of an inadvertent release is anticipated to be low; however, actual subsurface conditions encountered during construction may differ from those anticipated. Because an inadvertent release of drilling fluid would be localized and limited in duration, impacts on EFH, if they occur, would be expected to be minor and short-term.

Transco would stop the drilling activity if the volume of an inadvertent release of drilling fluid creates a threat to public health and safety or if an inspection/evaluation is needed to determine if mitigation measures, including the use of additional additives, are necessary to maintain the integrity of the drill hole. In the latter case, any suspension of drilling activity would be temporary. Transco has prepared an Offshore Horizontal Directional Drill Contingency Plan (see table 2.3-3) for the Project, which describes the measures that Transco would implement to prevent and identify inadvertent releases of drilling fluid.

Entrainment and Impingement

Temporary, minor, direct, and indirect adverse impacts on EFH species and other NOAA Trust Resources would be expected from seawater intake associated with pipeline construction. Approximately 3,489,482 gallons of seawater would be used to conduct hydrostatic testing of the Raritan Bay Loop. Juvenile and early stage adult fish and invertebrates could be impinged on the intake screens and zooplankton (including ichthyoplankton) could be entrained or entrapped. Indirect impacts could occur because planktonic fish and invertebrates serve as a source of food for some juvenile and adult fish species.

The seawater would be filtered at a fill rate of approximately 2,350 gpm through a 200-size mesh screen (i.e., with a mesh opening of 0.0029 inch). The water intakes would be positioned approximately 10 feet below the surface. It is assumed that any eggs or larvae entrained during hydrostatic testing would be killed. Several species may spawn seasonally in the Project area, while others may spawn offshore or upstream in surrounding waterbodies. In turn, spawning seasons and spawning habitat preference influence the species composition and density of ichthyoplankton. As part of the New York and New Jersey Harbor Deepening Project, the New York District of the USACE conducted ichthyoplankton sampling at several stations in Arthur Kill, Newark Bay, Upper New York Bay, and Lower New York Bay from January to June, 2011 (USACE, 2012b). Sampling was conducted using a plankton net mounted on an epibenthic sled. The methodology focused on sampling demersal ichthyoplankton; thus, ichthyoplankton that are found higher in the water column are likely to be underrepresented in the samples. A total of 22 taxa were collected in Lower New York Bay, including the EFH species Atlantic herring, summer flounder, windowpane flounder, and winter flounder. For non-EFH species, the dominant species was bay anchovy (representing 74.6 percent of the total catch), followed by American sandlance (8.8 percent of the catch). Average weekly densities in Lower New York Bay for all species combined ranged from 6 to 12,490 eggs and 12 to 2,006 larvae per 1,000 cubic meters (264,172 gallons). While this sampling effort was for a limited timeframe and did not sample the full water column, the density estimates can still be used to approximate the relative impact of the hydrostatic testing seawater withdrawal. Considering the volume of water required for hydrostatic testing, and the range of the average densities from the USACE (2012) sampling effort, the NESE Project could result in the loss of approximately 79 to 164,982 eggs and 159 to 26,498 larvae (all species combined). Considering the high fecundity potential for all species addressed, along with natural mortality, this limited entrainment of eggs and larvae during hydrostatic testing is not expected to cause a measurable impact on fish and invertebrate populations within the region.

Chemical Additives in the Hydrostatic Test Water

After evaluating potential options, Transco has selected CORRTREAT 15316 as their proposed corrosion inhibitor for use in the hydrostatic test water. CORRTREAT 15316 would be added to the hydrostatic test water in the pipeline at a concentration of 300 ppm. The test water would also be treated with a non-toxic fluorescent dye, Hydro Tag Clear, at a concentration of approximately 23 ppm to help detect potential leaks. Transco does not propose to use any other additives during hydrostatic testing of the Raritan Bay Loop. Transco plans to store the test water in the pipeline for at least 7 days, but potentially as long as 6 months, prior to discharge.

Following the completion of each test, the water would be discharged back into the marine environment through a multi-port diffuser in accordance with applicable standards and permits, such as the New York State water quality standards and the NYSDEC water quality certificate. The test water would be pumped back into the marine environment at a rate of approximately 2,350 gpm. This would re-oxygenate and mix the discharged water with the surrounding seawater thereby dispersing (diluting) the concentration of additives in the test water. Based on the proposed discharge rate, and assuming a 4-inch pipe, the expected critical dilution of CORRTREAT 15316 in the hydrostatic test water would be approximately 20 percent (60 ppm). Based on the results of Transco's toxicology testing and available literature (see section 4.5.2.8), the concentrations of CORRTREAT 15316 and Hydro Tag Clear proposed for discharge in the hydrostatic test water would not be expected to bioaccumulate in aquatic food webs or result in adverse impacts on aquatic organisms. Due to the low concentrations of additives expected in the discharge and the short-term nature of the discharge, hydrostatic testing would not be expected to cause adverse effects on EFH species or other NOAA Trust Resources.

Hydrocarbon Spills

Minor releases of hydrocarbons (e.g., fuel and lubricants) during construction of the proposed Project could result in short-term, minor, direct, and indirect adverse impacts on EFH and other NOAA Trust Resources. Minor releases of hydrocarbons (e.g., fuel, lubricants) or other chemicals during construction could originate from accidental spills from construction barges or support vessels, loss of fuel during fuel transfers, or other accidents such as collisions, allisions, or groundings. The impacts of spills are caused by either the physical nature of the material (e.g., physical contamination and smothering) or by its chemical components (e.g., toxic effects and bioaccumulation). Minor releases of hydrocarbons could also result in indirect adverse impacts on fish and invertebrate species from spills that affect their eggs and food sources. EFH could also be adversely affected by clean-up operations or through physical damage to habitats, primarily soft sediments. Impacts would depend on the depth and volume of the spill, as well as the properties of the material spilled.

All offshore vessels would be 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]), and would be required to register for the EPA NPDES Vessel General Permit, which includes measures to protect against impacts associated with discharges incidental to the operations of commercial vessels. Construction vessels would also adhere to Transco's Spill Plan and the USCG marine trash policy. These measures would protect EFH and NOAA Trust Resources from the potential for and impacts of hazardous spills.

Dredged Material Disposal

Transco proposes to use the HARS, located approximately 7.7 nautical miles south of Rockaway, New York, for the disposal of suitable dredged material. The HARS previously received contaminated sediments and other materials during 63 years of disposal activity, and the USACE is now capping the area with dredged material that meets certain USACE and EPA chemical criteria. Transco has conducted additional sampling and analysis to confirm that the Project-derived dredge material would be suitable for disposal at the HARS, and has prepared an application to the USACE for a permit under section 103 of the MPRSA to transport and dispose of the dredge material at the HARS. Potential effects on EFH from the disposal of dredged material in the HARS are addressed in the Programmatic Essential Fish Habitat Assessment for placement of dredged material at the site (USACE, 2002), and are incorporated here by reference. While Transco's intent is to dispose of suitable materials at the HARS, Transco has also secured a preliminary agreement with an upland disposal facility company in New Jersey to accept any dredge material not suitable for disposal at the HARS. Transco estimates that approximately 661,478 cubic yards of sediment would be disposed of in the HARS and approximately 160,417 cubic yards would be disposed of at an upland facility.

Operations

Operational activities for the Raritan Bay Loop would include maintaining, inspecting, repairing, and cleaning the pipeline. Within 10 years of being placed into service and every 7 years thereafter, Transco would inspect the Raritan Bay Loop with an intelligent pig, which does not require the removal of sediment, and would not impact EFH. In the event of non-routine in-water maintenance, Transco may need to excavate sediment in a localized area (e.g., potentially through the use of a suction dredge, divers using hand-jetting, or air-lifting equipment). The temporary displacement of these sediments would impact benthic and demersal EFH in the vicinity, but the impact would be relatively minor considering the small area affected and the long period of time between maintenance activities.

Operation of the Raritan Bay Loop would also affect EFH in the limited locations where the pipeline would be covered with concrete mattresses (i.e., at cable crossings where minimum burial depth cannot be achieved). The installation of exposed concrete mattresses (or mattresses with less than 1 foot of sediment cover) would have a long-term, minor, direct, adverse impact on EFH for fish and invertebrate species that are dependent on soft bottom habitats for survival. Long-term, minor, indirect, and direct beneficial impacts for fish and invertebrate species that inhabit hard bottom habitats could occur if these locations serve as artificial reef habitat.

4.5.3.3 EFH Conservation Measures

The NMFS provided 10 recommendations to ensure the conservation of EFH and other NOAA Trust Resources (NMFS, 2018). The NMFS' EFH conservation recommendations are listed below with our responses.

> *<u>NMFS Conservation Recommendation 1.</u> No dredging from January 1 to May 31 of each year in depths 20 feet or less including deeper waters within a 500-foot buffer of the 20-foot depth contour to minimize adverse effects to winter flounder early life stages and their EFH.*

> *<u>NMFS Conservation Recommendation 2.</u> No dredging or pile-driving from March 1 to June 30 of each year from MP 12 to MP 15 to minimize impacts to migrating anadromous species including alewife (Alosa pseudoharengus) and blueback herring (Alosa aestivalis), prey species for a number of federally managed species.*

> *<u>NMFS Conservation Recommendation 3.</u> No dredging from December 1 through April 30 of each year in the Ambrose Channel and Chapel Hill Channel, including a 500-foot buffer on either side of each channel to protect overwintering blue crabs.*

Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during the timing restriction windows, and has requested modification to some of the timing restrictions due to construction schedule constraints (see section 4.5.2.8 and table 4.5.2-7). As the timing restriction windows and allowable work have not been finalized, we have included a recommendation in section 4.5.2.8 that Transco provide documentation of agency approval for timing restrictions and allowable work prior to construction.

> *<u>NMFS Conservation Recommendation 4.</u> Provide to the New York and New Jersey state shellfisheries 30-day notice prior to the commencement of construction activities in shellfish areas to allow commercial harvest of shellfish in project area.*

As discussed in section 4.5.2.4, all of the New Jersey state waters crossed by the proposed Raritan Bay Loop are currently classified as prohibited for shellfish harvest. In New York waters, the Raritan Bay

Loop would cross certified (open) waters from near MP 34 to the Raritan Bay Loop tie-in with the Rockaway Transfer Point at MP 35.5. As discussed in section 4.8.6, to minimize impacts on commercial fisheries (including shellfisheries) in the offshore Project area, Transco would provide a Local Notice to Mariners and/or direct notice to commercial fishing operators. The notice would include dates and locations of active construction to allow commercial fishing operators to either harvest or remove equipment from the areas soon to be under construction. Transco would coordinate timing of active construction with NYSDEC to ensure commercial fishing operators have the opportunity to harvest major bottom-gear fishery areas prior to construction commencing. If the Project is approved and constructed, there would be no fishing restrictions in the area and fishing activities may resume as normal.

> *<u>NMFS Conservation Recommendation 5.</u> Provide documentation from U. S. Environmental Protection Agency (EPA) that the levels of contamination in the sediments within the Raritan Bay Slag Superfund site do not pose a risk to aquatic resources.*

As discussed in section 4.5.2.8, to assess the risk of the resuspension of contaminated sediments on aquatic resources, Transco conducted sediment sampling along the proposed pipeline route in 2016, 2017, and 2018, including within the RBS Superfund site. As discussed in section 4.7.8.2, the EPA has established a lead cleanup goal for the RBS Superfund site of 400 mg/kg, and the maximum concentration of lead in sediment samples from all of Transco's vibracore sample locations was 285 mg/kg. Transco also noted that the nearest area of the RBS Superfund site designated for cleanup is more than 200 feet from proposed Project excavations. Based on the discussion of the potential impacts of resuspension of contaminated sediments in section 4.5.2.8, we conclude that there is a low risk of adverse effects on aquatic resources from exposure to resuspended contaminants. Additionally, the EPA assisted the FERC in preparing this EIS and was consulted regarding potential impacts of the Project on contamination associated with the RBS Superfund site.

> *<u>NMFS Conservation Recommendation 6.</u> Within 30 days of completion of HDD activities (i.e., demobilization of the offshore HDD support vessel) and lowering of the offshore pipe, Transco should conduct a post-installation survey and begin backfill as necessary to meet the cover requirements for the HDD exit pit and pipeline facilities.*

After pipeline trenching and HDD activities are complete, Transco would begin backfilling and restore disturbed areas to the ambient contours of the surrounding seafloor (see sections 2.3.3.9 and 4.5.2.8). Areas of the pipeline that are installed using the jet trencher are not expected to require backfilling, as Transco estimates that at least 95 percent of the disturbed material would remain within the trench during pipeline lowering. Following backfilling, Transco would conduct a hydrographic survey to confirm that required burial depths were achieved and would add supplemental backfill as needed using a clamshell dredge. During supplemental backfilling activities, the clamshell bucket would be lowered below the water surface before release to help reduce loss of backfill and minimize turbidity. Transco anticipates that the hydrographic survey would be conducted within 30 days following the completion of all backfilling activities for the Raritan Bay Loop. Transco would also conduct an annual post-construction monitoring survey to ensure that adequate burial depth is maintained along the pipeline route.

> *<u>NMFS Conservation Recommendation 7.</u> A five-year post-construction monitoring plan should be developed to monitor the recovery of the bathymetry and benthic community for benthic habitat impacted by this project and provided for us to review. Annual monitoring reports should be provided to our office for the duration of the plan.*

To verify that benthic communities recover as expected, we have recommended in section 4.5.2.8 that, prior to construction of the Raritan Bay Loop, Transco file a 5-year post-construction benthic sampling and monitoring plan, prepared in consultation with the NMFS, for review and written approval of the

Director of the OEP. Specifically, we recommended that the plan identify the timing of sampling surveys, success criteria for assessing recovery of benthic species, and reporting requirements.

> *NMFS Conservation Recommendation 8.* *All areas of temporary impacts to wetlands should be restored and monitored to ensure restoration success. A restoration and monitoring plan should be provided to us for review.*

Transco's Project-specific Procedures are included as appendix F of the EIS. This document describes Transco's Procedures for the restoration and monitoring of wetlands and waterbodies in the Project area. We reviewed Transco's Procedures, found them to be acceptable, and determined that adherence to the requirements of this plan would reduce the impacts of the Project on wetlands and waterbodies.

> *NMFS Conservation Recommendation 9.* *Develop a frac-out plan for the horizontal directional drilling components of the project.*

Transco prepared a Project-specific Offshore Horizontal Directional Drill Contingency Plan that outlines measures to minimize the risk of HDD complications and inadvertent releases of drilling fluid, and includes measures such as monitoring along the drill path. As discussed in sections 2.3.3.5 and 4.5.3.2, we reviewed Transco's HDD designs and contingency plan and concluded that their implementation as proposed would minimize the likelihood and impact of an HDD drilling fluid release.

> *NMFS Conservation Recommendation 10.* *All barges and vessels associated with the project must float at all tidal stages.*

Transco has committed to the use of construction vessels and installation methods to ensure that all vessels associated with Project construction would float at all tidal stages, with the exception of the jack-up barge at the Ambrose Channel crossing and the temporary fixed platform at the Morgan Shore Approach, which would be secured in place using spuds or piles. Marine construction vessels are described in detail in section 2.3.3.1.

In addition to the minimization and mitigation measures discussed above and in section 4.5.3.2, Transco would also implement a Spill Plan to reduce the potential for accidental spills of oil and hazardous materials. The plan includes provisions that prohibit the onshore storage of fuel and other potentially toxic materials within specified distances of waterbodies, and procedures for refueling equipment that are designed to minimize potential spills. Transco's Spill Plan also includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction.

We are also recommending that Transco file a noise monitoring and mitigation plan to ensure actual construction noise does not exceed predicted noise levels.

Lastly, Transco would comply with all applicable regulatory requirements and programs designed specifically to protect aquatic resources. In New Jersey, Transco may mitigate impacts on shellfish areas through a monetary contribution to NJDEP's dedicated account for shellfish habitat mitigation, in accordance with NJAC 7:7-17.9. Transco is also coordinating with the NYSDEC about potential mitigation strategies for clam beds and benthic habitats.

4.5.3.4 EFH Conclusions

Project-related impacts on EFH and other NOAA Trust Resources would vary for different species and life stages based on several factors including their lifestyle, degree of dependence on the substrate, diet, habitat preferences, and the amount of suitable habitat present in the area. Species with a completely pelagic lifestyle would be affected to a lesser degree than demersal or benthic species.

Transco's use of the HDD method at the Morgan shore crossing would avoid or minimize impacts on EFH associated with the nearshore environment. Although potential impacts associated with the HDD method are possible, none of these impacts are expected to be regionally significant due to the small area that would be affected and the relatively short duration of any potential impact.

The excavation and backfilling activities for installation of the offshore pipeline would impact water quality, benthic substrate, and EFH, but the effect would be temporary or short-term and mitigated by several different measures, including restoration of the seafloor. Complete recovery of the benthic ecosystem would be dependent on the re-establishment of the habitat-forming organisms such as polychaete worms, bivalves, and other invertebrates that constitute the primary forage base for demersal fishes. We expect that affected benthic communities in the construction area would re-establish within 1 to 3 years as native assemblages recolonize the affected area or a new community develops as a result of immigration of organisms from nearby areas or from larval settlement. We have recommended that Transco file plans for post-construction benthic monitoring and sampling to ensure that benthic communities recover as expected.

Noise associated with pile driving, hand jetting, and jet trenching could disrupt fish behavior patterns within a relatively short distance of the activity. Based on Transco's acoustic modeling results, pile driving noise would exceed both the injury and behavioral disturbance thresholds for fish. The peak sound pressure injury threshold for fish would be exceeded within a very limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving are predicted to be large, but an individual fish would need to remain in the ensonified area for the entire duration of the pile driving event to experience an injury. Fish are likely to move away from the areas of construction activity before noise exceeds the behavioral disturbance or injury thresholds. Additionally, noise-generating activities at a given location would occur for relatively short periods of time during construction of the project. Noise from construction vessels is not expected to affect fish. To further reduce the potential for noise-related impacts, we have recommended that Transco provide and implement a noise monitoring and mitigation plan.

EFH could be adversely affected by the proposed water withdrawals or the discharge of hydrostatic test water infused with a corrosion inhibitor and fluorescent dye, but screening of the intake hose and use of a diffuser to re-oxygenate and dilute the discharge water would minimize the potential for impacts on EFH. EFH and NOAA Trust Resources could also be affected by a spill of hazardous materials, but Transco's implementation of its Spill Plan would minimize the risk.

Transco's implementation of the conversation measures discussed above and continued coordination with the applicable resource agencies would likely avoid or minimize impacts on NOAA Trust Resources and designated EFH.

4.6 THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

4.6.1 Regulatory Requirements and Species Identification

Special status species are those for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species classified as threatened or endangered; species considered as candidates or petitioned for federal listing by the FWS or the NMFS; and species that are designated as state-listed or receive special management considerations by Pennsylvania, New Jersey, or New York State.

4.6.1.1 Federal

Federal agencies are required by section 7 of the ESA (Title 19 USC Part 1536(c)), as amended (1978, 1979, and 1982), to ensure that any actions authorized, funded, or carried out by the agencies do not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat for a federally listed species. The FWS, which is responsible for terrestrial and freshwater species, and the NMFS, which is responsible for marine species, jointly administer the law. As the lead federal agency for the Project, the FERC is required to consult with the FWS and the NMFS to determine whether federally listed threatened or endangered species or designated critical habitat are found in the vicinity of the Project area, and determine the proposed action's potential effects on those species or their critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitats, the FERC is required to report its findings to the FWS and the NMFS in a Biological Assessment (BA). If the FERC determines that an action is likely to adversely affect a species (this would include any taking actions of a listed species under the MMPA), formal consultation is required. In response, the FWS and/or the NMFS would issue a Biological Opinion (BO) as to whether or not the federal agency action would likely jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitats. Per section 7(b) of the ESA and 50 CFR 402.14(e), from the date that formal consultation is initiated, the FWS and/or NMFS is allowed 90 days to consult with the agency and applicant, and 45 days to prepare and submit a BO (i.e., the BO would be issued to the FERC within 135 days of initiating formal consultation). The BO may include binding and/or discretionary recommendations to reduce impacts as well as an Incidental Take Statement for those actions that may harm or harass an ESA listed species or destroy or adversely modify designated critical habitat. An Incidental Take Statement cannot be authorized for a listed marine mammal until an MMPA IHA has been obtained from the NMFS.

To comply with section 7 of the ESA, we request that the FWS and the NMFS consider this EIS as our official BA for the NESE Project.

4.6.1.2 State

In addition to federal law, Pennsylvania, New Jersey, and New York have passed laws to protect state-listed threatened and endangered species. The state-specific regulations include the following:

- Pennsylvania – State-listed species are protected in Pennsylvania under Title 58, Part II of the Pennsylvania Code (58 Pennsylvania Code sections 75.1-75.4). In Pennsylvania, three agencies are responsible for protecting threatened and endangered species: 1) the PAGC has jurisdiction over state-listed birds and mammals; 2) the PAFBC monitors state-listed fish, reptiles, amphibians, and aquatic organisms; and 3) the PADCNR has jurisdiction over state-listed plants, natural communities, terrestrial invertebrates, and geological features. Pennsylvania state-listed species that could be affected are described in section 4.6.4.1.

- New Jersey – New Jersey's Endangered Species Conservation Act provisions are contained in the statute that authorizes the NJDEP's Endangered and Nongame Species Program to maintain the list of New Jersey's endangered and threatened wildlife species. The program is responsible for the protection and management of nearly 500 wildlife species, including 83 that are listed as endangered or threatened (NJDEP, 2017b). In addition, in 1989 the New Jersey Legislature declared that "plant species have medicinal, genetic, ecological, educational, and aesthetic value to the citizens of New Jersey" and directed the Division of Parks and Forestry in the NJDEP to develop and adopt a list of plant species that are endangered in New Jersey (Endangered Plant Species List Act, NJSA 13:1B-15.151 et seq.). The New Jersey Natural Heritage Program (NJNHP) and the Division of Land Use Regulation are responsible for administering the state endangered species law. Transco received natural heritage data for rare plants, animals, and communities from the NJNHP. New Jersey state-listed species that could be affected are described in section 4.6.4.2.

- New York – In New York, endangered species include any species of fish, shellfish, crustacea, wildlife, or plant designated by NYSDEC that are native species in imminent danger of extirpation or extinction in New York, as defined by 6 NYCRR § 182.2 and 193.3. Threatened species include native species likely to become an endangered species within the foreseeable future in New York based on the criteria for listing included in section 182.3(b) of this Part and that are listed as threatened in section 182.5(b). The NYSDEC is responsible for administering endangered species regulations for wildlife species and the New York Natural Heritage Program is responsible for plant species. New York state-listed species that could be affected are described in section 4.6.4.3.

4.6.2 Action Area

The action area (as defined in section 7(a)(2) of the ESA) considered in this BA includes all areas of the Project: the onshore pipeline routes, subsea pipeline route, compressor station and MLV facilities, vessel transit routes, and all associated onshore and offshore temporary workspaces (see section 2.2). Areas beyond the footprint of the Project area that could be affected by Project activities (i.e., construction activities causing sediments to be transported outside the Project area) were also considered part of the action area.

Transco proposes to use the HARS, located approximately 7.7 nautical miles south of Rockaway, New York, for the disposal of suitable dredged material. The HARS previously received contaminated sediments and other materials during 63 years of disposal activity, and the USACE is now capping the area with dredged material that meets certain USACE and EPA chemical criteria. Transco has conducted sampling and analysis to confirm that the Project-derived dredge material would be suitable for disposal at the HARS, and has prepared an application to the USACE for a permit under section 103 of the MPRSA to transport and dispose of the dredge material at the HARS. Potential effects on listed species from the routine disposal of dredged material in the HARS are addressed in previous ESA section 7 consultation with the NMFS (NMFS, 2012a). The NMFS' analysis concluded that any effects on leatherback sea turtles, Kemp's ridley sea turtles, green sea turtles, loggerhead sea turtles, North Atlantic right whales, humpback whales, fin whales, and Atlantic sturgeon would be insignificant or discountable. This previous consultation is incorporated by reference, and thus the HARS is not considered as part of the action area for this BA. In addition, the impacts of sediment disposal within the HARS is not expected to extend outside the boundaries of this area.

4.6.3 Federally Listed and Proposed Species

Transco, as a non-federal representative of the FERC, sought information regarding the presence of threatened or endangered species, species of special concern, and the existence of critical or significant habitats in the vicinity of the Project from the FWS and the NMFS.

We reviewed the information submitted by Transco for the proposed Project, performed our own independent analyses, and consulted directly with the FWS and the NMFS. We determined that 23 federally listed or proposed species may occur in the vicinity of the Project area. We determined that no critical habitat for any federally listed species is present in the Project area.

Due to the distance of their primary habitat from the Project area or the absence of individuals observed during field surveys, it was determined that the Project would have *no effect* on 7 of the 23 listed species. Justification for these no effect determinations is provided in table 4.6.3-1. Our analysis of the potential for the Project to impact the remaining 16 federally listed and proposed species and our determination of effect for each of these species are discussed in the following sections and listed in table 4.6.3-2. Based on consultation with the FWS, only the bog turtle was identified as potentially occurring in the vicinity of Compressor Station 200; therefore, impacts on federally listed species as a result of Compressor Station 200 are limited to the bog turtle discussion in section 4.6.3.4.

4.6.3.1 Mammals

Northern Long-eared Bat

The northern long-eared bat was federally listed as threatened on May 4, 2015, is a special concern species in Pennsylvania, and threatened in New York. The northern long-eared bat is known to or believed to occur in all Project counties in Pennsylvania, New Jersey, and New York (FWS, 2017c). The proposed Project workspace in New York occurs entirely offshore and, therefore, does not contain forest habitat suitable for northern long-eared bats. Therefore, the Project's potential to affect the northern long-eared bat is limited the Quarryville Loop, Compressor Station 206, and the Madison Loop.

The northern long-eared bat is about 3 to 3.7 inches long with a wingspan of 9 to 10 inches, and typically weighs between 0.2 and 0.3 ounce. It is distinguished from other *Myotis* species by its long ears. It eats insects and emerges at dusk to fly primarily through the understory of forest areas, feeding on moths, flies, leafhoppers, caddisflies, and beetles. Northern long-eared bats catch these insects while in flight using echolocation or by using gleaning behavior, catching motionless insects from vegetation and water (Harvey et al., 2011). Northern long-eared bats spend the winter hibernating in caves and abandoned mines. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices (FWS, 2016c).

The species was federally listed primarily due to the threat of white-nose syndrome, which is causing bats to disappear completely from many hibernation sites. Other threats to the northern long-eared bat include wind energy development and habitat destruction or disturbance (e.g., vandalism to hibernacula, and roost tree removal).

TABLE 4.6.3-1

Justification for Determinations of No Effect on Federally Listed Species for the Northeast Supply Enhancement Project

Common Name *Scientific Name*	Federal Status [a]	State Status [a]	Justification for Determination of No Effect
Marine Mammals			
Blue whale *Balaenoptera musculus*	E	NY – E NJ – E	Blue whales are rare in the shelf waters of the eastern U.S., and the species is best considered an occasional visitor to the region (NMFS, 2017a; Waring et al., 2011). Blue whales are occasionally observed off Cape Cod, MA, which is thought to represent the southern limit of the blue whale's feeding range (NMFS, 2017a; Waring et al., 2011; Cetacean and Turtle Assessment Program (CETAP), 1982). Based on the preference of blue whales for deeper offshore waters and their infrequent occurrence in the region, the blue whale is not expected to occur in the Project area or be exposed to effects of the Project.
Sei whale *Balaenoptera borealis*	E	NY – E NJ – E	Sei whales are found globally in subtropical to subpolar waters on the continental shelf edge and slope, typically in deeper waters far from the coastline (NMFS, 2017d; Waring et al., 2016). In the northwestern Atlantic Ocean, sei whales are provisionally divided into two stocks – the Nova Scotia stock and the Labrador Sea stock. The Nova Scotia stock is thought to be centered on the Scotian Shelf, with the southern portion of the species' range extending to the Gulf of Maine (Waring et al., 2016; CETAP, 1982). Based on the preference of sei whales for deeper offshore waters, the sei whale is not expected to occur in the Project area or be exposed to effects of the Project.
Sperm whale *Physeter macrocephalus*	E	NY – E NJ – E	The sperm whale is a toothed whale that inhabits the deeper waters of the world's oceans throughout the year (NMFS, 2017e). Sperm whales could utilize the offshore Project area, but they are more likely to occur in the deeper waters of the continental slope. Consequently, we conclude that the sperm whale is not expected to occur in the Project area or be exposed to effects of the Project.
Plants			
Swamp pink *Helonias bullata*	T	NA	Swamp pink is a shade-tolerant plant and has been found in wetlands with canopy closure varying between 20 to 100 percent. Sites with minimal canopy closure are less vigorous due in part to competition from other species (FWS, 2016a). Upon the recommendation of the FWS, Transco conducted surveys for the swamp pink within potentially suitable habitat (non-tidal wetlands) along the Madison Loop in August and December 2016, and January 2017. No individuals were identified during field surveys. In letters dated April 17, 2017 and May 14, 2018, the New Jersey Field Office of the FWS concurred with the negative survey results for the swamp pink. Therefore, we conclude that Project activities would have *no effect* on the swamp pink.
Marine Reptiles			
Hawksbill sea turtle *Eretmochelys imbricata*	E	NJ – E NY – E	The hawksbill sea turtle is widely distributed throughout the tropical waters of the world's oceans and most commonly associated with healthy coral reefs. In the continental U.S., hawksbill turtles are primarily found in Florida and Texas, but have been recorded along the east coast as far north as Massachusetts (NMFS, 2017g). Between 1986 and 2007, no strandings of this species were reported in Middlesex County, NJ; Monmouth County, NJ; Queens County, NY; Richmond County, NY; or Kings County, NY (Sea Turtle Standing and Salvage Network, 2017). Hawksbill turtles could be present in the offshore Project area during the summer months, but the likelihood of occurrence is very low. Thus, we do not expect individuals to be present or exposed to effects of the Project.
Fish			
Cusk *Brosme brosme*	C, SC	NA	The primary habitat for cusk is deep waters with rocky, hard bottom substrates. In the Northwest Atlantic, cusk range from New Jersey to Newfoundland, but in U.S. waters, cusk are primarily associated with deeper waters in the central Gulf of Maine (NMFS, 2017l). Due to the lack of suitable habitat in the Project area, we conclude that cusk are not expected to occur in the Project area or be exposed to effects of the Project.
Oceanic whitetip shark *Carcharhinus longimanus*	PT	NA	The oceanic whitetip shark is a pelagic species associated with warm, open ocean waters (NMFS, 2017m). As this species typically occurs well offshore, it is not expected to be present in the Project area or be exposed to effects of the Project.

[a] E = Endangered, T = Threatened, C = Candidate species, PT = Proposed for Threatened Status, SC = Species of Concern, NA = Not Applicable.

TABLE 4.6.3-2

Federally Listed and Proposed Species Potentially Occurring in the Northeast Supply Enhancement Project Area

Common Name *Scientific Name*	Federal Status [a]	State Status [a]	Project Area Where Species May Occur	Determination of Effect
Terrestrial Mammals				
Northern long-eared bat *Myotis septentrionalis*	T	PA – SC NY – T	Quarryville Loop Compressor Station 206 Madison Loop	Not Likely to Adversely Affect (NLAA) [b]
Indiana bat *Myotis sodalis*	E	PA – E NJ – E NY – E	Quarryville Loop Compressor Station 206	NLAA
Marine Mammals				
North Atlantic right whale *Eubalaena glacialis*	E	NY – E NJ – E	Raritan Bay Loop	Likely to Adversely Affect (LAA)
Fin whale *Balaenoptera physalus*	E	NJ – E NY – E	Raritan Bay Loop	LAA
Birds				
Piping plover *Charadrius melodus*	T	NJ – E	Raritan Bay Loop	NLAA
Red knot *Calidris canutus rufa*	T	NJ – E [c]	Raritan Bay Loop	NLAA
Roseate tern *Sterna dougallii dougallii*	E	NJ – E NY – E	Raritan Bay Loop	NLAA
Eastern black rail *Laterallus jamaicensis jamaicensis*	PT	NJ – E	Madison Loop	Not Likely to Jeopardize
Plants				
Seabeach amaranth *Amaranthus pumilus*	T	N/A	Raritan Bay Loop	NLAA
Terrestrial Reptiles				
Bog turtle *Glyptemys muhlenbergii*	T	PA – E	Quarryville Loop Compressor Station 200	NLAA
Marine Reptiles				
Green sea turtle (North Atlantic DPS) [d] *Chelonia mydas*	T	NJ – E NY – T	Raritan Bay Loop	NLAA
Kemp's ridley sea turtle *Lepidochelys kempii*	E	NJ – E NY – E	Raritan Bay Loop	NLAA
Leatherback sea turtle *Dermochelys coriacea*	E	NJ – E NY – E	Raritan Bay Loop	NLAA
Loggerhead sea turtle *Caretta caretta*	T	NJ – E NY – T	Raritan Bay Loop	NLAA
Fish				
Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus* (Chesapeake Bay, New York Bight, Carolina, and South Atlantic DPS) [d]	E	NJ – E NY – E	Raritan Bay Loop	LAA
Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus* (Gulf of Maine DPS) [d]	T	NJ – E NY – T	Raritan Bay Loop	LAA
Shortnose sturgeon *Acipenser brevirostrum*	E	NJ – E NY – E	Raritan Bay Loop	NLAA

TABLE 4.6.3-2 (cont'd)

Federally Listed Species Potentially Occurring in the Northeast Supply Enhancement Project Area

Common Name *Scientific Name*	Federal Status [a]	State Status [a]	Project Area Where Species May Occur	Determination of Effect

[a] E = Endangered, T = Threatened, SC = Special Concern, PT = Proposed Threatened.
[b] Per the Final 4(d) Rule (FWS, 2016b).
[c] Breeding population only.
[d] DPS = distinct population segment. A DPS is defined as a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.

Sources: NMFS, FWS, NJDEP, NYSDEC, PAGC, PAFBC.

Potential Impacts

Fragmentation of forested habitat used for foraging or migration by the northern long-eared bat may impact the species. The northern long-eared bat is a forest-interior species adapted to cluttered forest environments, and the species roosts and forages in closed, intact forest stands (Lausen, 2009). Northern long-eared bats have also been known to forage forest edges, paths, riparian areas, and ponds and streams (WIDNR, 2013; Henderson and Broders, 2008). A reduction in the amount of forested habitat available in the general vicinity of roost trees or foraging areas could alter use patterns in an area or preclude use of an area altogether. Even marginally suitable fragmented forest can become important habitat to listed bat species as undisturbed or less fragmented forests become less available (Medlin et al., 2010; Gorresen and Willig, 2004). Forest structure and fragmentation study conducted in Missouri Ozark forests found that in areas dominated by forest cover, nonforest areas may provide landscape heterogeneity fulfilling some habitat requirement not provided in a fully forested landscape for northern long-eared bats (Yates and Muzika, 2006).

Noise and lights associated with nighttime construction activities when bats are foraging (e.g., HDD, facility construction) may affect protected bat species, particularly in areas of limited habitat where bat colonies are already stressed. This disruption may lead to reduced fitness for both adult female bats and their young. Studies have shown that bats can habituate to transient, low intensity and ongoing airborne sound and human activities. However, significant changes in baseline noise levels in an area can result in temporary to permanent alteration of bat behavior. At low noise levels or farther distances, bats may initially startle, but then habituate to low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees), many bats would probably be startled to the point of flushing from their daytime roosts and in some cases may experience increased predation risk. For projects that continue for multiple days with noise levels greater than levels usually experienced by bats, bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely. Overall, it is reasonable to assume that some bats may be temporarily disturbed by noise and vibration of construction activities within or directly adjacent to previous roosting habitat. Combined with the loss of forest habitat, a shift in roosting behavior away from newly constructed corridors would be anticipated (Belwood, 2002; FWS, 2007b and 2016g; Hendricks et al., 2004).

Determination of Effect

No known hibernacula, maternity roost trees, or swarming areas occur near the Quarryville Loop, Compressor Station 206 site, or the Madison Loop (FWS, 2016d; 2016e). Therefore, per the Final 4(d) Rule (FWS, 2016b), the Project would not result in prohibited incidental take, because of the following:

- Transco would not clear known maternity roost trees or trees within 150 feet of known maternity roost trees between June 1 and July 31;

- Transco would not remove trees within 0.25 mile of a known hibernacula at any time of the year; and

- Project activities would not occur within known hibernacula.

As part of the northern long-eared bat's Final 4(d) rule, the FWS completed a non-jeopardy BO and proposed an optional framework to streamline section 7 consultations for projects that may affect the species but will not cause prohibited take. Federal agencies can rely upon the finding of the BO and optional framework to fulfill their project-specific section 7 responsibilities if they notify the FWS 30 days prior to implementing the action. We intend to utilize this optional framework for the Madison and Quarryville Loops, and the 4(d) Rule Streamlined Consultation Forms were provided to the FWS on November 7, 2018 (see appendix H). Per the New Jersey Field Office of the FWS' recommendation, Transco would conduct tree clearing activities between October 1 and March 31 at Compressor Station 206.

Based on Transco's implementation of tree clearing timing restrictions at Compressor Station 206, and our utilization of the optional framework for the Quarryville and Madison Loops, we conclude that the Project *may affect, but is not likely to adversely affect the* northern long-eared bat. In a letter dated May 7, 2018 the Pennsylvania Field Office of the FWS concluded that, based on Transco's utilization of the optional framework for the Quarryville Loop, prohibited take of the northern long-eared bat would be avoided. In a letter dated May 14, 2018, the New Jersey Field Office of the FWS concurred with our determination. Therefore, consultation is complete for the northern long-eared bat.

Indiana Bat

The Indiana bat is a federally listed endangered species and is a state-listed endangered species in Pennsylvania, New Jersey, and New York. The Indiana bat may occur in the NESE Project area in Lancaster County, Pennsylvania and Somerset County, New Jersey (FWS, 2017d).

The Indiana bat is relatively small, weighing only 0.25 ounce, and has a wingspan of 9 to 11 inches. The fur is dark-brown to grayish. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines from approximately November through March. For hibernation, the bats require cool, humid caves with stable temperatures under 50 °F but above freezing. Very few caves within the range of the species have these conditions. The hibernacula typically have large volumes of Indiana bats and often have large rooms and vertical or extensive passages (FWS, 2006c). In April and May, Indiana bats begin migrating to their summer roosting sites. When active, Indiana bats roost in dead or dying trees, or live trees with exfoliating bark. A bat roost is a location where bats sleep during non-active periods, including daylight hours, or rest for brief periods during the night. During the summer months, most reproductive females occupy roost sites that receive direct sunlight for more than half the day. Roost trees generally are found within canopy gaps in a forest, along fence lines, or along a wooded edge. Maternity roosts are found in riparian zones, bottomland, floodplain habitats, wooded wetlands, and upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (FWS, 2007c).

Threats to the Indiana bat vary during its annual cycle. At the hibernation sites (hibernacula), threats include modifications to caves, mines, and surrounding areas that change airflow and alter microclimate in the hibernacula. Human disturbance and vandalism pose significant threats during hibernation through direct mortality and by inducing arousal and consequent depletion of fat reserves. White-nose syndrome, a fungal disease, has recently been added as a threat due to the death of millions of hibernating insect-eating bats in 25 states and 5 Canadian provinces since the winter of 2007/2008. Natural catastrophes can also have a significant effect during winter because of the concentration of individuals in relatively few sites. During summer months, possible threats relate to the loss and degradation of forested habitat. Migration pathways and swarming sites may also be affected by habitat loss and degradation.

Potential Impacts

The potential impacts on the Indiana bat would be similar to those described above for the northern long-eared bat.

Determination of Effect

As mentioned above, the Indiana bat may occur in the counties that would be affected by the Quarryville Loop in Pennsylvania and Compressor Station 206 in New Jersey.

In an e-mail dated July 27, 2016, the Pennsylvania Field Office of the FWS indicated that surveys and/or time-of-year restrictions would only be required for the Indiana bat if forest clearing impacts for the Quarryville Loop totaled 40 acres or more. If the Project would impact 40 acres or more of forest habitat, the Pennsylvania Field Office of the FWS recommended that Transco either conduct mist-net surveys or restrict tree clearing between April 1 and November 15 to avoid direct impacts on the Indiana bat. Construction of the proposed Quarryville Loop would involve clearing approximately 7 acres of forest habitat; therefore, per the Pennsylvania Field Office of the FWS, no further mitigation is required in Pennsylvania for the Indiana bat.

In a letter dated August 29, 2016, the New Jersey Field Office of the FWS recommended that Transco restrict tree clearing between April 1 and September 30 in New Jersey to avoid direct impacts on the Indiana bat as a result of construction of Compressor Station 206. Transco has agreed to the tree clearing timing restrictions recommended by the New Jersey Field Office of the FWS.

Based on the limited amount of tree clearing required for the Quarryville Loop and implementation of the tree clearing timing restriction at Compressor Station 206, we have determined that the Project *may affect, but is not likely to adversely affect* the Indiana bat. In letters dated May 7 and May 14, 2018, the Pennsylvania and New Jersey Field Offices of the FWS, respectively, concurred with our determination. Therefore, consultation is complete for the Indiana bat.

North Atlantic Right Whale

The North Atlantic right whale (hereafter referred to as right whale) is federally listed as endangered and state-listed as endangered in New York and New Jersey (NMFS, 2017c; NYSDEC, 2017b; NJDEP, 2017c). The majority of the right whale population in the North Atlantic is found in coastal or shelf waters ranging from winter calving grounds in southeastern U.S. waters to summer feeding grounds in New England waters north to the Bay of Fundy and Scotian Shelf (NMFS, 2017c). Right whale distribution is strongly correlated to the distribution of their prey, which consists primarily of zooplankton, including copepods, euphausiids, and cyprids (NMFS, 2017c). Recent analysis of sightings data suggests a positive and slowly accelerating trend in population; however, right whales remain critically endangered with an estimated population of 476 individuals as of 2011 (Waring et al., 2016). Two of the biggest threats to the right whale are vessel collisions and entanglement in fishing gear (Waring et al., 2016). Other threats include habitat degradation, contaminants, climate and ecosystem change, disturbance from whale-watching activities, noise, and natural threats from predators (e.g., large sharks, killer whales) (NMFS, 2017c).

No critical habitat for the right whale has been identified within the Project area; the nearest critical habitat for the species is located in the northeastern foraging area offshore of Massachusetts and Maine (NMFS, 2017c). The route for the proposed Raritan Bay Loop is located on the periphery of a right whale SMA associated with the Port of New Jersey and New York (see figure 4.6.3-1). SMA boundaries are designated within a 20-nautical-mile radius of major ports along the east coast of the United States. The SMA associated with the Port of New Jersey and New York is in effect from November 1 to April 30 to protect right whales from interactions with vessels during migration. According to the NMFS Northeast Fisheries Science Center's (NEFSC) North Atlantic right whale sightings database, between January 2007 and September 2017, 10 right whale sightings were detected in the vicinity of the Project area, 2 of which were within the Project area (1 in the Lower New York Bay along proposed vessel traffic routes, and 1 near the Rockaway Transfer Point) (NEFSC, 2017). Based on this information, we conclude that right whales could be observed within the vicinity of the Raritan Bay Loop during migration (generally November through April but potentially continuing into the summer). Given the infrequency of past sightings, the chance of a right whale occurring in the vicinity of the proposed pipeline during construction is low.

Potential Impacts

Principal stressors that could directly affect right whales include vessel strikes and noise. Right whales could also be affected by inadvertent hydrocarbon spills. Consequences of these stressors range from temporary disruption of normal behaviors to injury or mortality. Nearly all large whale species are vulnerable to ship strikes, and these incidents are often fatal (Knowlton and Kraus, 2001). Based on a database of all known ship strikes worldwide through 2002, right whales were the third most often reported species struck (comprising about 13 percent of all records), after fin whales (about 26 percent of all records), and humpback whales (about 15 percent of all records) (Jensen and Silber, 2003). The NESE Project is not expected to generate a large amount of vessel traffic. Construction of the offshore pipeline is expected to last up to 9 months, with offshore construction activities potentially occurring 24 hours a day, 7 days a week. Over the 9-month construction period, the average number of Project-related construction vessels working in the area would be about 20 vessels, with a maximum of 40 vessels. Additional traffic would occur due to Project-related vessels transiting to and from the HARS. Not all deployed vessels would be transiting each day, as some would be stationed offshore and only occasionally return to dock to refuel or due to unfavorable weather conditions. Project-related vessels (and their typical drafts) are described in section 2.3.3.1 and table 2.3.3-2. After transiting to a work site, construction vessels would either progress slowly along the pipeline route (e.g., during pipelay) or be temporarily stationed at a single work site (e.g., during HDD pit excavation). At any given location along the proposed offshore pipeline route, the time needed for construction activities would range from a few hours to a few weeks, and would likely include several breaks in activity due to crew shift changes, weather windows, etc. While the Project would result in an increase in vessel traffic, the effect would be small and localized relative to existing traffic into and out of the busy Port of New Jersey and New York (see section 4.8.7.3). Additionally, as discussed in section 4.5.2.8, Transco would implement its Marine Mammal Observer Training and Response Protocol Plan and utilize NMFS-approved observers to monitor for protected species and maintain a watch for marine mammals, including right whales. Vessels associated with pipeline construction would comply with vessel speed restrictions, approach/distance restrictions, and observer/lookout protocols required by the NMFS, including regulations prohibiting the approach of right whales closer than 1,500 feet (457.2 meters). Transco has stated that all vessels 65 feet (19.8 meters) or longer would travel at speeds no greater than 10 knots (11.5 mph) while traveling within the right whale SMA between November 1 and April 30. Additionally, Transco would monitor right whale sighting reports (e.g., Sighting Advisory System reports, Dynamic Management Area report, NOAA Weather Radio) to ensure vessel operators are informed of the location of right whales that may be present within the Project area. With Transco's implementation of these measures, vessel traffic is not expected to affect right whales or result in a vessel strike.

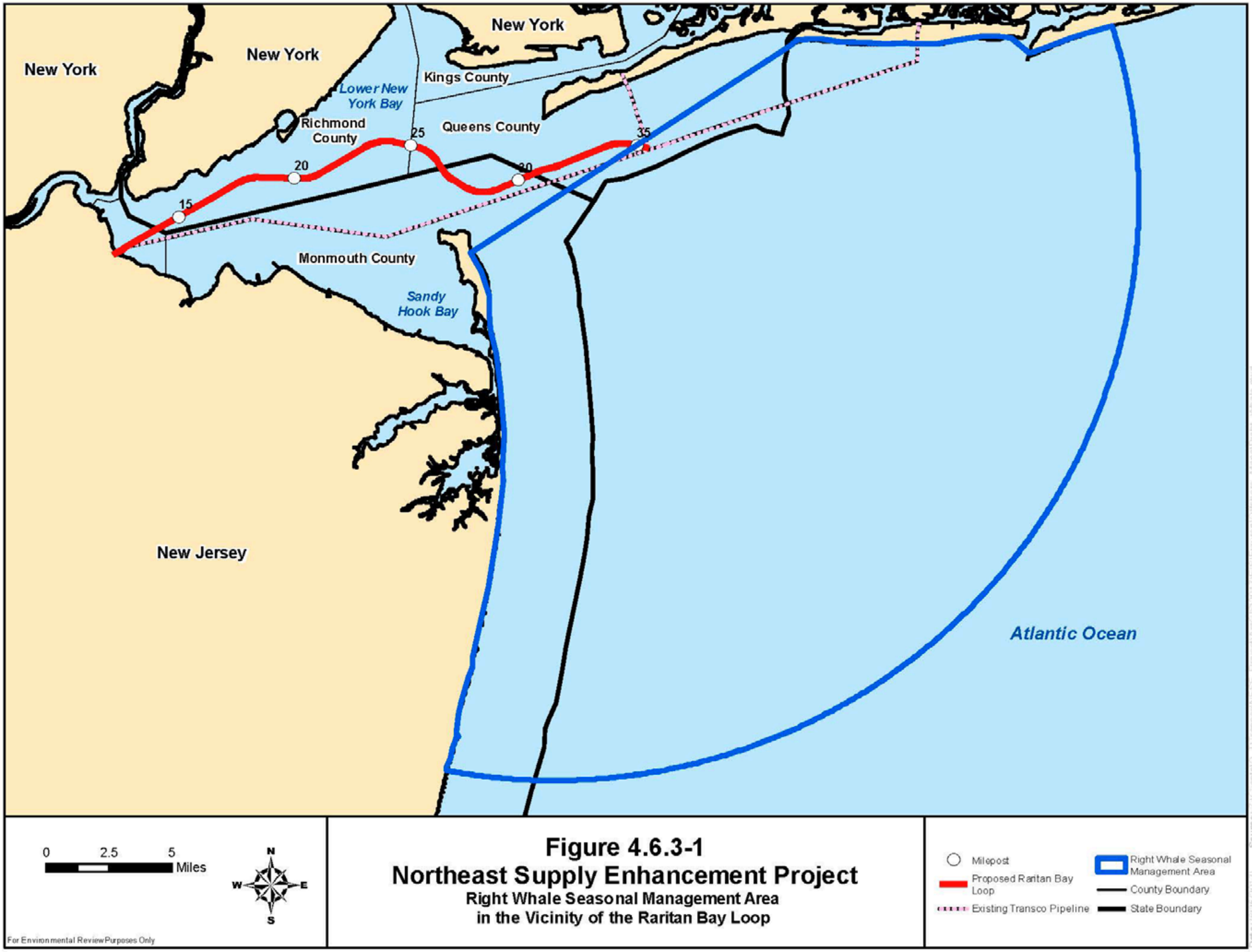

Figure 4.6.3-1
Northeast Supply Enhancement Project
Right Whale Seasonal Management Area in the Vicinity of the Raritan Bay Loop

Noise from construction activities would be generated along the offshore pipeline route. The majority of the pipeline route would be installed using a jet trencher or clamshell dredge. Clamshell dredging activities are not expected to generate noise that would cause behavioral disturbance of right whales (i.e., above 120 dB re 1 μPa RMS). Jet trenching activities may generate noise levels above 120 dB RMS, but this would be limited to the few minutes before the jetting "swords" are lowered into the sediment and would occur within less than 100 feet of the trencher. Given the extremely limited duration and extent of elevated noise levels, jet trenching activities are not expected to disturb right whales.

Pile driving would be an additional source of noise. As discussed in section 4.5.2.8, vibratory devices and impact hammers would be used to install 163 temporary piles consisting of steel pipe 10 to 60 inches in diameter. Of the 163 piles, 34 piles would be installed via a combination of diesel impact hammer and vibratory device. The remainder of the piles would be installed with a vibratory device. Transco anticipates that the time needed to install one pile via vibratory device is approximately 15 minutes of continuous vibration. For impact hammer-driven piles, the anticipated driving time is approximately 38 to 62 minutes per pile, with approximately 3,382 strikes per pile at MP 29.4 of the Ambrose Channel HDD, and approximately 1,920–2,500 strikes per pile at other locations. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. The milepost, size, type, purpose, installation time and duration, and removal time and duration of all proposed piles are summarized in table 2.3.3-4.

Known effects of noise on marine mammals have been reviewed by various sources (National Research Council, 2003; Southall et al., 2007; Weilgart, 2007). Human-made sounds can affect the ability of marine mammals to communicate and to receive information about their environment. Such noise can interfere with or mask the sounds used and produced by these animals and thereby interfere with their natural behavior. Observed effects of noise on marine mammals include changes in vocalizations; changes in respiration, swim speed, diving, and foraging behavior; increased alertness; temporary or permanent displacement; avoidance; shifts in migration path; stress; hearing damage; panic; and strandings (National Research Council, 2003; Southall et al., 2007; Weilgart, 2007). Noise exposure may affect the vestibular and neurosensory systems of marine mammals (primarily pinnipeds) and potentially respiratory patterns (Southall et al., 2007). Marine mammal responses to noise vary widely depending on the species, the context and duration of exposure, the type of noise source, the time of day or year, the reproductive state of the animal, the activity of the animal at the time of exposure, and the experience or prior exposure of the animal (National Research Council, 2003; Southall et al., 2007). Minor or temporary behavioral effects are often evidence that an animal has heard a sound and may not indicate lasting consequence for exposed individuals (Southall et al., 2007). Determining if short-term changes in behavior represent a biologically significant effect is difficult. Immediate or short-term changes in behavior could represent short- or long-term effects on a population. Long-term impacts of greatest concern include reduced health and viability of a population.

Hearing ranges identified for large open ocean whales are based on the assumption that the sound production range of the species is an indicator of their hearing range (Richardson et al., 1995; Ketten, 1998). Large baleen whales like the right whale, fin whale, and humpback whale are assumed to primarily be sensitive to low-frequency sounds. The estimated hearing range for baleen whales is 7 Hz to 35 kHz (NMFS, 2016b). Right whales have been recorded producing tonal sounds between 20 and 1,000 Hz (Parks and Tyack, 2005) as well as vocalizations recorded in the 20 to 200 Hz range (Mellinger, 2004). 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).

Based on the noise analysis discussed in section 4.5.2.8, we conclude that right whales are not likely to be injured by pile driving activities. Though Transco estimates that the injury threshold for low-frequency cetaceans would be exceeded within up to 3.0 miles of the pile driving activities, a right whale would need to spend approximately 24 hours within this zone of exceedance to potentially experience an injury, which is unlikely given Transco's mitigation measures and the very low likelihood of a right whale being present in the Project area during construction. Noise from pile driving installation and removal activities would exceed the behavioral disturbance threshold for cetaceans and could disturb right whales (if present) within approximately 13.4 miles of the pile driving activities. Given the amount of existing vessel traffic noise in the Project area, as well as noise monitoring reports from other recent underwater pile driving activities (e.g., Naval Facilities Engineering Command Southwest, 2018), we expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances. Transco is consulting with the NMFS and submitted a draft application in June 2018 for an IHA to incidentally take small numbers of marine mammals by harassment. The NMFS defines two levels of marine mammal harassment due to noise levels under the MMPA: Level A (injury or "take") and Level B (harassment). Following the filing of the draft IHA request, Transco's revised its acoustic analysis to incorporate sound source levels recommended by NMFS. However, Transco cannot currently estimate the final number of incidental harassment takes that will be requested in their final IHA application because the take estimates are dependent on the results of a NMFS internal working group that is in the process of developing guidance on modeling acoustic harassment for short-term cumulative noise exposure. Additionally, the NMFS cannot issue an IHA more than one year in advance of offshore construction. As a result, final incidental take numbers are not available for inclusion in this final EIS. Transco expects that their final IHA request will include a small number of Level B harassment takes of North Atlantic right whale. Transco does not expect Level A right whale takes to occur as a result of the Project.

Transco would deploy NMFS-approved observers to conduct surveys before, during, and after all vibratory pile-driving activities to monitor for marine mammals within a 0.62-mile (1,000-meter) clearance zone. This monitoring would begin 30 minutes before and end 30 minutes after any pile driving activity. If the pile driving equipment is off for more than one hour between uses, another 30-minute monitoring period would take place to clear the area before resuming operations. If marine mammals are observed within the clearance zone during the 30 minutes prior to start up, start-up would be delayed until all marine mammals are observed to leave the clearance zone on their own, or until no marine mammals are observed within the clearance zone for 30 minutes. Once the zone has been cleared, the pile installation or removal activity would begin with a "soft-start." This clearance zone is intended to prevent potential injury of marine mammals. Additionally, Transco has committed to shut down pile driving operations if any right whales are observed at any distance from the pile driving site. Operations would resume when at least 30 minutes has passed since the last right whale sighting. If right whales are observed at any time while observers are present, sightings would be reported to the NMFS North Atlantic Right Whale Sighting Advisory System to aid in alerting other vessels in the area. Transco also proposes to conduct all pile installation and removal activities in the months of June, July, and August, when right whales are least likely to be present. Additional marine mammal mitigation measures are discussed in section 4.5.2.8. Additionally, we have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with the predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8).

As discussed in section 4.5.2.8, the background noise in the underwater environment in the Project area is likely similar to the noise that would be generated by the largest vessels that would be used during construction of the pipeline. Vessels and barges positioned at a single work site for several days or weeks would typically be anchored or spudded such that minimal noise would be generated by engine propulsion. When vessels are transiting, engine noise would generally only persist for a matter of minutes at any given location. As such, we do not expect that the relatively small number of vessels associated with the NESE

Project would substantially affect the existing underwater noise environment. Therefore, we do not expect that vessel noise associated with the Project would adversely affect right whales.

Transco plans to conduct hydrographic surveys to verify bottom features in advance of and concurrent with pipe-laying activities along the Raritan Bay Loop. Within 30 days following the completion of all backfilling activities for the Raritan Bay Loop, Transco would also conduct a hydrographic survey to verify that the contours of the seafloor have been restored. The hydrographic survey equipment used for the Project could include a single- or multi-beam echo sounder, a high-resolution side-scan sonar, and/or a magnetometer. As discussed in section 4.5.2.8, these devices produce pulsed noise at very high frequencies that are outside of the functional hearing range of large baleen whales like right whales. A frequency-modulated (chirp) acoustic sub-bottom profiler may also be used during construction to help detect buried features and confirm the final burial depth of the pipeline. Transco anticipates using an equipment model with a maximum output of approximately 180 dB re 1 μPa RMS in the range of 2 to 24 kHz. The sub-bottom profiler would likely be used for two surveys along the entire route (pre- and post-backfill). Transco estimates that each survey would last approximately 10 days, with the profiler in use for up to 24 hours per day. The noise produced by the sub-bottom profiler would likely be audible to right whales; however, the intensity of this sound source would be low and of limited duration. In Transco's analysis for its IHA request, the intensity of the sub-bottom profiler was low enough to result in no estimated acoustic harassment of marine mammals. We conclude that the proposed hydroacoustic surveys are not anticipated to have adverse effects on right whales.

Minor releases of hydrocarbons (e.g., fuel, lubricants) during construction could result in impacts on right whales. Spills could originate from accidental spills from construction barges or support vessels, loss of fuel during fuel transfers, or other accidents such as collisions, allisions, or groundings. The impacts of hydrocarbons are caused by either the physical nature of the material (e.g., physical contamination and smothering) or by its chemical components (e.g., toxic effects and bioaccumulation). These impacts would depend on the depth and volume of the spill, as well as the properties of the material spilled. Inadvertent hydrocarbon spills could affect right whales present within the Project area during the spill; however, these impacts, if they occur, are expected to be limited to the immediate area and minor because the offshore vessels would adhere to the USCG marine trash policy and Transco's Spill Plan, which includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction vessels (see table 2.3-3). Because of these practices, it is unlikely that right whales would be exposed to operational waste, solid debris, or hydrocarbon spills during construction. Additionally, right whales are not expected to be adversely affected by the discharge of hydrostatic test water or an inadvertent release of HDD drilling fluid. Right whales would also be able to move out of discharge areas that would cause them discomfort or harm.

Operational activities for the Raritan Bay Loop would include inspection with a smart pig within ten years of being placed into service and every seven years thereafter. Transco has designed the Raritan Bay Loop such that internal inspections required by PHMSA regulations would not disturb the seafloor. Thus, maintenance activities are not expected to have adverse impacts on right whales.

Determination of Effect

The potential effects of the Project on right whales would be limited primarily to noise associated with the installation and removal of temporary piles. We consider the risk of this activity to be low due to the very low probability of a right whale transiting near the area when construction is in progress. The risk of effects would be reduced further by Transco's various mitigation measures, including the implementation of its Marine Mammal Observer Training and Response Protocol Plan and the use of NMFS-approved observers to monitor for marine mammals. Additionally, we recommend that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8). Transco's proposed use of marine mammal observers and reduced speed of construction vessels would also substantially reduce the chance of a vessel strike during construction. However, because Transco plans to request one or more Level B harassment takes for right whale under the MMPA, and given the duration of noise-generating activities, we assume that there is also the potential for ESA harassment.[27] Thus, we have determined that the NESE Project *may affect, and is likely to adversely affect* the North Atlantic right whale.

Fin Whale

The fin whale is federally listed as endangered and state listed as endangered in New York and New Jersey (NMFS, 2017b; NYSDEC, 2017b; NJDEP, 2017c). The fin whale is comprised of two distinct sub-subspecies found in the Atlantic Ocean. Fin whales occurring in waters along the east coast of the United States are from the western North Atlantic stock (Waring et al., 2016). Fin whales are the most common large whale species observed in U.S. waters from Cape Hatteras, North Carolina, northward (Cetacean and Turtle Assessment Program (CETAP), 1982). Fin whales are large, fast swimmers, and prefer deep, offshore waters. They feed on krill, small schooling fish, and squid during the summer months and migrate to warmer waters during the winter (NMFS, 2017b).

No critical habitat has been designated for the western North Atlantic fin whale stock (NMFS, 2017b), but fin whales have been recorded aggregating in areas to the east and north of Cape Cod during the spring and summer months, and within the vicinity of the Delaware Bay/Delaware Peninsula during winter and spring (CETAP, 1982). Fin whales have been observed in waters south of Long Island, most commonly off of the eastern end of the island, but some sightings have occurred off northern New Jersey (CETAP, 1982). Between 2009 and 2013, six fin whale mortalities or injuries were recorded in the New York Bight (Waring et al., 2016). A fin whale stranding was also reported in December 2012 in Breezy Point, Queens (Newman et al., 2012). Fin whales are unlikely to be present in the shallower waters of Raritan Bay, and there have been no reported observations of a fin whale in the vicinity of the Project in recent years (Ocean Biological Information System – Spatial Ecological Analysis of Megavertebrate Populations, 2017). Based on the documented occurrence information, and the preference of fin whales for deeper offshore waters, it is expected that any fin whales present in the Project area would be transient and infrequent.

Historically, commercial whaling was the most prominent threat to fin whales. Based on historical data, fin whales are the most often reported large whale to be hit by vessels (Jensen and Silber, 2003). Other threats to fin whales include entanglement in fishing gear, reduced prey abundance due to overfishing, habitat degradation, and disturbance from low frequency noise (NMFS, 2017b).

<u>Potential Impacts</u>

The potential impacts on the fin whale would be similar to those already described above for the North Atlantic right whale. Transco expects that their final IHA request will include a small number of Level B harassment takes of fin whale. Transco does not expect Level A fin whale takes to occur as a result of the Project.

[27] The definitions of harassment under the MMPA and ESA are not equivalent. In December 2016, the NMFS issued interim guidance on the term "harass" under the ESA, defining it as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering."

Determination of Effect

The potential effects of the Project on fin whales would be limited primarily to noise associated with the installation and removal of temporary piles. We consider the risk of this activity to be low due to the low probability of a fin whale transiting near the area when construction is in progress. The risk of adverse effects would be reduced further by Transco's various mitigation measures, such as the implementation of its Marine Mammal Observer Training and Response Protocol Plan and the use of NMFS-approved observers to monitor for marine mammals. Additionally, we have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8). Transco's proposed use of marine mammal observers and reduced speed of construction vessels would also substantially reduce the chance of a vessel strike during construction. However, because Transco plans to request one or more Level B harassment takes for fin whale under the MMPA, and given the duration of noise-generating activities, we assume that there is also the potential for ESA harassment. Thus, we have determined that the NESE Project *may affect, and is likely to adversely affect* the fin whale.

4.6.3.2 Birds

Piping Plover

The piping plover is a federally listed threatened and state-listed endangered species in Middlesex County, New Jersey and is present on Rockaway Point/Peninsula beaches along the Atlantic Ocean and Jamaica Bay shorelines to breed and forage (FWS, 2018a). The species is migratory, arriving to breed in New Jersey in early to mid-March and migrating to winter on the Gulf Coast by September (FWS, 2007d; NYSDEC, 2017b). The piping plover nests on dry sandy beaches of the Atlantic Coast and is known to nest along the northern point of the Sandy Hook Unit in the Gateway National Recreation Area (FWS, 2016f; 2017b), which is approximately 1 mile from the Raritan Bay Loop.

Threats to the piping plover include habitat loss, human disturbance of nesting birds, predation, and oil spills and other contaminants. Other threats include habitat loss results from development, as well as from beach stabilization, beach nourishment, and other physical alterations to the beach ecosystem.

Because the nearest offshore construction activities would be approximately 1 mile from the northern point of the Sandy Hook Unit, we conclude that the Project *may affect, but is not likely to adversely affect* the piping plover. The New Jersey Field Office of the FWS stated, in letters to Transco on April 17, 2017 and FERC on May 14, 2018 concurred with our determination.

The New York and Long Island Field Offices of the FWS stated in an April 16, 2018 letter that while plovers could potentially forage anywhere along the ocean and bay shorelines along Rockaway Point, plover breeding is documented at select ocean and bay beaches, which would be avoided. Based on this, the New York and Long Island Field Offices of the FWS concluded that only transient individuals are expected to be present within the open water habitat where the pipeline would occur. Based on this information, the New York and Long Island Field Offices concurred with our determination. Therefore, consultation is complete for the piping plover.

Red Knot

The red knot is a federally listed threatened and state-listed endangered species in Middlesex County, New Jersey and migrates through New York, utilizing coastal marine and estuarine habitats to and from its breeding sites in the spring and fall (FWS, 2018a). Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late-July through November) migration periods. Smaller numbers of knots may spend all or part of the winter in New Jersey (FWS, 2017e). The red knot breeds in the tundra of the central Canadian Arctic. Some of these robin-sized shorebirds fly more than 9,300 miles from south to north every spring and reverse the trip every autumn, making the red knot one of the longest-distance migrating animals. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Mussel beds on New Jersey's southern Atlantic coast are also an important food source for migrating knots. The red knot is known to occur along the northern point of the Sandy Hook Unit in the Gateway National Recreation Area (FWS, 2016f; 2017b), which is approximately 1 mile from the Raritan Bay Loop, during the spring and fall migration periods.

Threats to the red knot include sea level rise; coastal development; shoreline stabilization; dredging; reduced food availability at stopover areas; disturbance by vehicles, people, dogs, aircraft, and boats; and climate change.

The New York and Long Island Field Offices of the FWS stated in an April 16, 2018 letter that red knot presence could occur along the entire Rockaway Point ocean and bay shorelines during migration through New York in the spring and fall; and concluded that only transient individuals are expected to be present within the open water habitat where the pipeline would occur. In addition, the New Jersey FWS stated in a letter to Transco, dated April 17, 2017, that it is unlikely the red knot would be disturbed by construction activities because the nearest offshore construction activities would be approximately 1 mile from the northern point of the Sandy Hook Unit. Based on this, we conclude that the Project *may affect, but is not likely to adversely affect* the red knot. In letters dated May 14, 2018 and April 16, 2018, the New Jersey and New York FWS offices, respectively, concurred with our determination. Therefore, consultation is complete for the red knot.

Roseate Tern

The roseate tern is a federally listed endangered and state-listed endangered seabird in Kings and Richmond Counties, New York. In New Jersey, the roseate tern is considered a transient migrant through the Atlantic Coast Flyway (FWS, 2017b). The roseate tern nests in colonies on small barrier islands and coastal habitats in the northeast (FWS, 2011). The species is migratory, arriving to breed in the northeast in April and then migrating to the waters off the coast of South America in August (FWS, 2011). The roseate tern is a specialist feeder, eating almost exclusively small fish, primarily the American sand lance. They are "plunge-divers" and often submerge completely when taking prey (Gochfeld et al., 1998). Roseate terns fly as much as 25 to 30 kilometers to feed (Heinemann, 1992, Spendelow *in* Gochfeld et al., 1998).

Populations in the northeastern United States greatly declined in the late 19th century due to hunting for the millinery, or hat trade. In the 1930s, protected under the MBTA, the population reached a high of about 8,500, but since then, population numbers have declined and stayed in the range of 2,500 to 3,300 individuals.

<u>Potential Impacts</u>

Construction noise could adversely affect roseate terns present in the Project area. Noise impact thresholds for the roseate tern have not been established, and bird species vary widely in their responses to noise. Based on a literature review, Dooling and Popper (2007) developed interim guidelines for potential effects of noise on birds. Dooling and Popper's (2007) review indicated that birds can tolerate continuous (up to 72 hours) exposure to noises up to 110 dBA[28] without experiencing hearing damage or permanent hearing loss. At continuous noise levels between 93 and 110 dBA, birds can experience temporary hearing loss lasting from seconds to days, depending on the intensity and duration of the noise exposure. Dooling and Popper (2007) also estimated that noise levels of 50 to 60 dBA may begin to interfere with acoustic communication in birds.

If present in the area of pile driving activities associated with HDD construction, roseate terns could potentially be subjected to in-air sound levels of approximately 79.2 dBA at 140 feet from the HDD activities**.** Roseate terns could experience short-term moderate impacts, as noise associated with construction could cause temporary displacement of birds from particular areas or behavior changes. Noise exposures sufficiently intense to cause physical injury (e.g., direct trauma, hearing loss, physiological stress) would be unlikely, because in-air construction noise is unlikely to exceed the 110 dBA threshold. In-air construction noise levels are expected to fall below 65 dBA at distances greater than approximately 0.6 mile (1 kilometer) from the HDD exit and entry locations.

As discussed in section 4.5.3.1, increases in turbidity can affect fish physiology and/or behavior. Mobile fish species in the Project area would likely temporarily leave the construction area to avoid an increase in turbidity. As a result, foraging opportunities for terns would be reduced in areas of elevated suspended sediments. However, Project-specific modeling by Transco indicates that construction-related turbidity would return to ambient conditions typically within 1 hour of disturbance.

Artificial lighting during offshore HDD activities could affect roseate terns. Offshore HDD activities would be conducted 24 hours per day by security lighting, navigation lights, and Federal Aviation Administration-mandated warning lights.

Determination of Effect

Construction of the Raritan Bay Loop could impact foraging or migrating terns due to construction related noise and lighting, and increased sedimentation which could result in decreased feeding efficiency. Based on the short-term nature of the construction, the amount of available habitat in the area, and the existing level of vessel traffic, lighting, and noise in Raritan Bay, we conclude that the Project *may affect, but is not likely to adversely affect* the roseate tern.

In a letter dated April 16, 2018, the New York and Long Island Field Offices of the FWS stated that the roseate tern has the potential to be present within the Rockaway Point/Peninsula area to breed and forage from the time they arrive from southerly wintering areas in May until their departure to wintering grounds between August and September. They further noted that, although Rockaway Point does provide marginally suitable breeding habitat, there have been no records of breeding or important forage areas occurring either on or in the vicinity of Rockaway Point since 1998; and as such, concurred with our determination. Therefore, consultation is complete for the roseate tern.

[28] A-weighting is commonly used in noise measurement and puts the greatest emphasis on sound levels to which humans are most sensitive, effectively cutting off frequencies that the average human cannot hear. Because an animal's response to sound is related to the range of frequencies to which it is most sensitive, the A-weighting system is not considered appropriate for other animals. Unweighted (dB) or C-weighted sound pressure levels are more accurate for birds (AMEC, 2005), who typically vocalize most and hear best in the frequency region of 2-4 kHz (Dooling and Popper, 2007). Noise measured as dBA only provides a rough estimate, and is likely an overestimate, of the noise level in the frequency region where birds hear and communicate (Dooling and Popper, 2007).

Eastern Black Rail

On October 9, 2018, the FWS proposed the eastern black rail for listing as threatened under the ESA, with a final rule anticipated no later than October 2019 (83 FR 50610). Under the ESA, federal agencies are required to confer with the FWS on agency actions that may be likely to jeopardize a proposed species. The FWS would typically finalize or withdraw the listing about 12 months after the proposal depending on comments received; ESA protections become effective 30 days after the final listing rule is published.

Eastern black rails are found in a variety of salt, brackish, and freshwater marsh habitats that can be tidally or non-tidally influenced. Within these habitats, the birds occupy relatively high elevations along heavily vegetated wetland gradients, with soils that are moist or flooded to a shallow depth (83 FR 50610). Eastern black rails require dense vegetation cover that allows movement underneath the canopy. Plant structure is considered more important than plant species composition in predicting habitat suitability for the subspecies (83 FR 50610). Occupied habitat tends to be primarily composed of fine-stemmed emergent plants (rushes, grasses, and sedges) with high stem densities and dense canopy cover (83 FR 50610). However, when shrub densities become too high, the habitat becomes less suitable for eastern black rails. Soils are moist to saturated (occasionally dry) and interspersed with or adjacent to very shallow water (1 to 6 centimeters) (83 FR 50610).

Black rails have been detected during the breeding period within nine Pennsylvania counties between the early 1800s and 2013 (Watts, 2016). Although not well documented, the species was apparently a common breeder within the vast tidal marshes of the upper Delaware River in Philadelphia. These marshes were lost to urban expansion during the 1800s as was the ability of this area to support breeding black rails (Watts, 2016). Two Pennsylvania breeding bird atlas projects have been conducted including the first from 1983 through 1989 and the second from 2004 through 2009. A black rail individual was detected near Quarryville in Lancaster County during the first breeding bird atlas project in 1985. Breeding has been confirmed only in Philadelphia, and the only recent record (since 2010) of a black rail observation is from Berks County in 2013 (Watts, 2016).

New Jersey has the distinction of having the largest number and longest running record of black rail observations of any state throughout the species range (Watts, 2016). Black rails have been detected during the breeding period within ten New Jersey counties between the early 1800s and 2016. Breeding has been confirmed in seven counties including Ocean, Atlantic, Cape May, Burlington, Cumberland, Sussex and Mercer (Watts, 2016). There are no known historic or recent records in Middlesex or Somerset Counties. Most of the black rail activity in New Jersey has been on the Atlantic Coast where more than 120 nests were collected between 1910 and 1940 (Watts, 2016). The most concentrated breeding occurred in narrow marshes along the sound side of the barrier islands. All of these populations were lost during the post war development boom either by wetland filling or grid ditching for mosquito control (Watts, 2016).

Primary threats to the eastern black rail include habitat loss due to continued alteration and loss of wetland habitats, land management practices that result in fire suppression (or inappropriately timed fire application that may cause direct mortalities), grazing, haying and mowing, and impounding of wetlands (FWS, 2018b). In addition, projected sea level rise and associated tidal flooding, increased temperatures, decreased precipitation, increased drought and severe weather events producing flooding or changes in wildfire frequency and intensity are all likely to have significant impacts on eastern black rail populations and their habitat (FWS, 2018b).

PEM wetlands are the most common type of wetlands that would be impacted by construction of the Quarryville and Madison Loops. Some of the wetlands that would be impacted occur in conjunction with other wetland types, known as wetland complexes; for example, several of the PEM wetlands that would be impacted occur in conjunction with other wetland types (PSS, PFO, or E2EM). Construction of Compressor Station 206 would impact two wetland complexes. No wetlands would be impacted by construction at Compressor Station 200 or the Raritan Bay Loop.

Transco's consultation with NJNHP and NJDEP regarding review of the Madison Loop identified the eastern black rail as a state endangered species (see section 4.6.4). As discussed in section 4.5.1.2, Transco has agreed to adopt vegetation clearing windows during construction to minimize impacts on nesting migratory birds.

Although potentially suitable habitat for the eastern black rail is present along the Madison and Quarryville Loops, most records of black rail occurrences in New Jersey have been along the Atlantic Coast and there are no known occurrences in Middlesex or Somerset Counties. In Pennsylvania, there are no known breeding black rail or recent occurrences. Therefore, we conclude that the Project *may affect, but is not likely to jeopardize* the eastern black rail. If the eastern black rail were to become listed prior to or during construction, FERC staff would be required to complete any necessary section 7 consultation. Because our previous consultation with the FWS did not include consideration of the eastern black rail, **we recommend that:**

- **Transco should not begin construction activities until:**

  a. FERC staff completes conference with the FWS regarding the eastern black rail, if required; and

  b. Transco has received written notification from the Director of OEP that construction or use of mitigation may begin.

4.6.3.3 Plants

Seabeach Amaranth

The seabeach amaranth is a federally listed plant species that is native to Atlantic Coast beaches and barrier islands. The primary habitat of seabeach amaranth consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of non-eroding beaches (landward of the wrackline), although the species occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, inter-dunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. Seabeach amaranth usually grows on a nearly pure sand substrate, occasionally with shell fragments mixed in (FWS, 2017f).

Seabeach amaranth occupies elevations from 8 inches to 5 feet above mean high tide. The plant grows in the upper beach zone above the high tide line, and is intolerant of even occasional flooding during its growing season. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. Vegetative associates of seabeach amaranth include sea rocket (*Cakile edentula*), seabeach spurge (*Chamaesyce polygonifolia*), and other species that require open, sandy beach habitats (FWS, 2017f). However, this species is intolerant of competition and does not occur on well-vegetated sites. Seabeach amaranth is often associated with beaches managed for the protection of beach nesting birds such as the piping plover and least tern (FWS, 2017f). The seabeach amaranth is known to occur along the Sandy Hook Unit in the Gateway National Recreation Area (FWS, 2017b), which is approximately 1 mile from the Raritan Bay Loop at its nearest approach.

Threats to seabeach amaranth include beach stabilization (particularly the use of beach armoring, such as sea walls and riprap), intensive recreational use, mechanical beach raking, and herbivory by insects (FWS, 2017f).

Transco would utilize the HDD construction method to install the pipeline beneath the New Jersey beach and shoreline, which would avoid disturbing potential seabeach amaranth habitat. Activities between the HDD entry point and the shoreline would be limited to pedestrian monitoring of the drill path for inadvertent releases of drilling fluid. Because the nearest offshore construction activities would be located approximately 1 mile from the Sandy Hook Unit, we conclude that the Project *may affect, but is not likely to adversely affect* the seabeach amaranth. The FWS New Jersey Field Office indicated in an April 17, 2017 letter to Transco and a May 14, 2018 letter to FERC that it concurs with this determination. Therefore, consultation is complete for the seabeach amaranth.

4.6.3.4 Reptiles

Bog Turtle

The bog turtle is a federally listed threatened species and a state-listed endangered species in Pennsylvania. In Pennsylvania, bog turtles can occur in Lancaster and Chester Counties. One of the smallest turtles in the world, the adult bog turtle carapace is approximately 3.1 to 4.5 inches long (FWS, 2017g). Bog turtles can be easily identified by their mahogany-colored shell and bright yellow-orange blotches on both sides of the head. Bog turtles live in a mosaic of open, sunny, spring-fed wetlands, and scattered dry areas that provide habitat and shelter for basking, foraging, nesting, and hibernation. Bog turtles are active, feeding, and nesting from April through October, with eggs hatching from late August through September. The species is dormant in the winter, burrowing in logs, mud, or tree roots (FWS, 2010).

The greatest threats to the bog turtle are the loss and fragmentation of its habitat. Fragmenting connected wetlands limits the bog turtle's ability to find mates and new habitat, and increases the amount of edge around the wetlands. Increased edge provides habitat for predators and increases the likelihood of invasion by non-native and non-wetland plants. The bog turtle is also illegally collected for market by disreputable pet traders (FWS, 2010). Potential bog turtle habitat is identified by the following three criteria:

- Suitable hydrology is groundwater driven and includes some or all of the following: springs, shallow surface water, persistently saturated soils, subsurface flow, and rivulets.
- Suitable soils, which are the critical criterion, include a bottom substrate of soft muck. The term "muck" does not refer to a technical soil type; it can be soft deep peat or mineral mud.
- Suitable vegetation includes dominant vegetation consisting of low grasses and sedges, possibly a scrub-shrub wetland component, and a relatively open canopy (FWS, 2006).

<u>Potential Impacts</u>

Construction of the Project within wetland habitats has the potential to impact bog turtles. If present during construction, bog turtles could be directly injured or killed by construction equipment, or disturbed due to the presence of humans and machines in the area. In addition, construction and operation of the Project could alter wetland habitats that support this species. As discussed in section 4.3.4.3, construction of the Project has the potential to alter wetland hydrology and increase the risk of invasive plant establishment/spread.

Determination of Effect

At the request of the Pennsylvania Field Office of the FWS, Transco completed Phase 1 bog turtle habitat surveys of all wetlands along the Quarryville Loop in Lancaster County and within 300 feet of Compressor Station 200 in Chester County.

Transco provided the Pennsylvania Field Office of the FWS with Phase 1 bog turtle survey results from a previous project at Compressor Station 200, which indicated that suitable bog turtle habitat is not present in the Compressor Station 200 work area. In an e-mail dated April 25, 2017, the Pennsylvania Field Office of the FWS concurred with the findings and confirmed that additional surveys for bog turtles would not be required in the Compressor Station 200 work area.

In August 2016, Transco conducted Phase 1 surveys along the Quarryville Loop in accordance with *Guidelines for Bog Turtle Surveys* (FWS, 2006). Transco identified suitable bog turtle habitat at seven wetlands in the Quarryville Loop work area. Phase 2 (presence/absence) surveys were conducted at the seven wetlands between April 26 and May 23, 2017, and a Phase 3 (trapping) survey was conducted at one wetland due to the high quality of the habitat between May 9 and June 1, 2017. No bog turtles were observed or captured during the Phase 2/3 surveys in the Quarryville Loop work area. In a letter dated July 5, 2017, the Pennsylvania Field Office of the FWS confirmed its review of the Phase 2/3 survey report and agreed that construction of the proposed Quarryville Loop would not affect the bog turtle.

Based on the results of the surveys which identified uninhabited but suitable habitat at seven locations along the Quarryville Loop, we conclude that the Project *may affect, but is not likely to adversely* affect the bog turtle. In a letter dated May 7, 2018, the Pennsylvania Field Office of the FWS concurred with our determination. Therefore, consultation is complete for the bog turtle.

Sea Turtles

Four federally listed sea turtle species have the potential to occur within the Project area. All four species may transit and/or forage in the Project area, but do not have nesting habitat or critical habitat in the region. Considering the Project-related activities and potential stressors, there are no meaningful differences in susceptibilities among the sea turtle species potentially occurring in the Project area. Therefore, these species are discussed as a group.

The green sea turtle is a federally listed species with 11 distinct population segments (DPSs), 8 of which are listed as threatened, and 3 of which are listed as endangered (NMFS, 2017f). The North Atlantic DPS is federally listed as threatened, and the species is state-listed as threatened in New York and endangered in New Jersey (NMFS, 2017f; NYSDEC, 2017b; NJDEP, 2017c). The green sea turtle is found throughout the world's oceans in tropical and sub-tropical waters. Along the U.S. Atlantic coast, green turtles are found in inshore and nearshore waters from Florida to Massachusetts (NMFS, 2017f). As one of the more coastal species of sea turtle, green sea turtles forage primarily on benthic organisms. Food sources include seagrasses and algae as well as animals such as mollusks, crustaceans, bryozoans, sponges, jellyfish, polychaetes, echinoderms, fish, and fish eggs (Bjorndal, 1997; NMFS and FWS, 1991). Threats to this species include harvest outside of the United States, incidental capture in fishing gear, marine debris, pollution, disease, and loss or degradation of nesting habitat (NMFS, 2017f). Green sea turtles are found during summer months in the northern Atlantic where they typically feed in shallow waters abundant in algae or marine grass (CETAP, 1982). Between 1986 and 2007, only four strandings of green turtles were reported in the vicinity of the offshore Project area, consisting of one in Middlesex County, New Jersey; one in Monmouth County, New Jersey; and two in Richmond County, New York (Sea Turtle Standing and Salvage Network (STSSN), 2017). No strandings were reported in Queens or Kings Counties, New York during this time period. As there is no known foraging habitat in the Project area, green turtles in the offshore Project area are likely to be transient and infrequent; however, the species potentially could be present between June and early November.

The Kemp's ridley sea turtle is a federally listed endangered species and is also state-listed as endangered in New York and New Jersey (NMFS, 2017h; NYSDEC, 2017b; NJDEP, 2017c). Adult Kemp's ridley turtles are generally found in relatively shallow nearshore areas with muddy or sandy bottoms. Their prey items include swimming crabs, fish, jellyfish, and mollusks (NMFS, 2017h). These sea turtles face threats similar to many other sea turtles including egg harvesting, incidental capture in fishing gear, marine debris, pollution, disease, and loss or degradation of nesting habitat (NMFS, 2017h). Kemp's ridley turtles are commonly encountered in New York waters and have been observed off the coast of Long Island (CETAP, 1982; Morreale et al., 1992). In July of 2018, a single Kemp's ridley sea turtle laid eggs on Queens Beach in the Gateway National Recreation area (NPS, 2018). However, nesting in the Project area is not a normal occurrence, and this was the first recorded case of a Kemp's ridley sea turtle nesting and depositing eggs in New York State. Additionally, the eggs would not have survived without human intervention and relocation. The NPS excavated the nest and incubated the eggs, resulting in 96 hatchlings that were later released on West Beach. Between 1986 and 2007, 30 strandings of Kemp's ridley sea turtles were reported in the vicinity of the offshore Project area, consisting of 22 in Monmouth County, New Jersey; 6 in Queens County, New York; and 2 in Richmond County, New York (STSSN, 2017). No strandings were reported in Middlesex County, New Jersey or Kings County, New York during this time period. While the species is more commonly found within Long Island Sound, we conclude that the presence of transient individuals in the offshore construction area is possible during the spring, summer, and fall months (May through early November).

The leatherback sea turtle is a federally listed endangered species throughout its range, and is the largest and most pelagic of the sea turtles (NMFS, 2017i). In New York and New Jersey, the leatherback turtle is state-listed as endangered (NYSDEC, 2017b; NJDEP, 2017c). This species occurs globally, and ranges farther north and south than the other sea turtle species, likely due to leatherbacks' ability to maintain warmer body temperatures (NMFS, 2017i). Although considered omnivorous (feeding on sea urchins, crustaceans, fish, and floating seaweed), leatherbacks feed principally on soft foods such as cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) (Bjorndal, 1997; NMFS and FWS, 1992). Threats to leatherback turtles include harvest outside of the United States, incidental capture in fishing gear, marine debris, pollution, disease, and loss or degradation of nesting habitat (NMFS, 2017i). Leatherbacks have been observed on the east coast of the U.S. from North Carolina to Maine, with the greatest concentrations reported between Long Island and the Gulf of Maine. Concentrations of migrating leatherbacks have been observed south of central Long Island and to the east of New Jersey (Shoop and Kenney, 1992); however, most sightings along Long Island have been towards the northern end of the island away from the Project area (CETAP, 1982). The waters south of Long Island are not expected to be important feeding habitat for leatherback sea turtles, but leatherbacks may feed in this area during migrations. Between 1986 and 2007, 101 strandings of this species were reported in the vicinity of the offshore Project area, consisting of 1 in Middlesex County, New Jersey; 83 in Monmouth County, New Jersey; 10 in Queens County, New York; 1 in Richmond County, New York; and 6 in Kings County, New York (STSSN, 2017). Because leatherbacks have been documented in the general area, we conclude that the species could potentially occur within the offshore construction area during the spring, summer, and fall (May through November).

The loggerhead sea turtle initially was listed as federally threatened throughout its range, but in 2011, the species was divided into nine DPS, four of which are listed as threatened, and five of which are listed as endangered (NMFS, 2017j). The Northwest Atlantic Ocean DPS is federally listed as threatened, and the species is state-listed as threatened in New York and endangered in New Jersey (NMFS, 2017j; NYSDEC, 2017b; NJDEP, 2017c). The main foraging areas for loggerheads in the region are relatively shallow continental shelf waters, where they feed on whelks and conch (NMFS, 2017j). The main threat to loggerhead sea turtles is incidental capture in fishing gear. Other threats include harvest outside of the United States, marine debris, pollution, disease, and loss or degradation of nesting habitat (NMFS, 2017j). Loggerhead turtles are the most abundant species of sea turtle in U.S. coastal waters, and the most frequently observed sea turtle species in the Project area, generally between June and mid-November. During these summer and fall months, waters of the continental shelf in the New York Bight have been reported to harbor significant concentrations of loggerheads (CETAP, 1982). Between 1986 and 2007, 232 strandings of this species were reported in the vicinity of the offshore Project area, consisting of 4 in Middlesex County, New Jersey; 141 in Monmouth County, New Jersey; 27 in Queens County, New York; 45 in Richmond County, New York; and 15 in Kings County, New York (STSSN, 2017). Because they have been documented in the region, we conclude that loggerheads potentially could occur within the offshore Project area between June and November.

<u>Potential Impacts</u>

Given that no nesting habitat is known to or expected to occur in the offshore Project area, the principal stressors that could directly affect sea turtles are disturbance to the seafloor, noise, vessel strikes, exposure to resuspended contaminants, inadvertent hydrocarbon spills, and inadvertent releases of drilling fluid. Consequences of these stressors range from temporary disruption of normal behaviors to injury or mortality from vessel strikes.

Construction of the Project would result in the direct disturbance of approximately 87.8 acres of the seafloor (see section 2.2.1.2). This estimate includes direct impacts on the seafloor from mechanical activities (e.g., pipeline installation), vessel mooring systems/anchor placement, temporary piles, and entry/ exit excavations for HDD operations. Based on Project-specific sediment transport modeling (discussed in section 4.5.2.8), an additional 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.3 centimeter of sediments disturbed by the offshore construction activities, including backfilling. Based on Transco's benthic survey, the seafloor crossed by the proposed Raritan Bay Loop consists primarily sandy sediments in Lower New York Bay and the Atlantic Ocean, and a higher proportion of fine sediments like silt and clay in Raritan Bay. In Transco's benthic survey conducted in 2016, no submerged aquatic vegetation habitats were observed along the Raritan Bay Loop. Sea turtles may be temporarily displaced from preferred foraging areas in the vicinity of the offshore construction area. However, because of the extensive coverage of similar habitat in the vicinity of the Project, the potential for detectable consequences on foraging habits from the Project are not likely.

Sea turtles can be injured or killed if struck by a vessel, particularly if struck by an engaged propeller. Increased vessel traffic could result in a higher number of collisions between ships and sea turtles, thereby increasing the occurrence of sea turtle injuries or fatalities. Although adult sea turtles can be visible at the surface during the day and in clear weather, they are difficult to spot from a moving vessel when resting below the water surface or during nighttime or periods of inclement weather. Sea turtles spend most of their lives submerged and thus are difficult to see by vessel operators. Construction of the Project is not expected to generate a large amount of vessel traffic. Additionally, because of the water depths within the Project area, Transco plans to use pipelay barges and clamshell dredge barges moored with pre-positioned anchors when excavating and installing the offshore sections of the pipeline and placing additional backfill material; thus, propeller use by the larger Project-related vessels would be limited. Over the 9-month construction period, the average number of Project-related construction vessels working in the area would be about 20 vessels, with a maximum of 40 vessels. Additional traffic would occur due to Project-related vessels transiting to and from the HARS. Not all deployed vessels would be transiting each day, as some would be stationed offshore and only occasionally return to dock to refuel or due to unfavorable weather conditions. Project-related vessels (and their typical drafts) are described in section 2.3.3.1 and table 2.3.3-2. While the Project would result in an increase in vessel traffic, the effect would be small and localized relative to existing traffic into and out of the busy Port of New Jersey and New York (see section 4.8.7.3). Additionally, Transco would implement its Marine Mammal Observer Training and Response Protocol Plan and train vessel operators and crews to recognize protected species and employ avoidance measures, such as slowing down or maneuvering away if sea turtles are observed. Vessel operators would also conform to federal regulations that prohibit the approach of sea turtles closer than 150 feet (45.7 meters). Therefore, we conclude that sea turtle vessel strikes are unlikely to occur as a result of the Project.

Sea turtles may be at risk of injury or mortality from direct interactions with construction equipment operating on the seafloor. In previous BOs, the NMFS has concluded that non-hopper type dredging methods like clamshell dredging are slower than hopper-type dredging methods and are unlikely to overtake or adversely affect sea turtles (NMFS, 2015b). Thus, interactions between sea turtles and construction equipment are possible, though in the event of an interaction, we do not expect that sea turtles would be at serious risk of injury or mortality from these activities due to the slow rates of movement of the dredging and jetting equipment. Hand-jetting activities would be diver-assisted and would occur at a slower rate than jet trenching. We conclude that adverse effects on sea turtles from interaction with construction equipment are unlikely and discountable.

Noise and disturbance impacts would be associated with the construction phase of the Project. All four species of sea turtles area could be exposed to construction vessel and pile driving noise if present in the Project area during construction. The biological significance of hearing in sea turtles remains largely unstudied, but it is likely that they use sound for navigation, locating prey, avoiding predators, and for general environmental awareness (Piniak, 2012). Sea turtles do not appear to use sounds for communication (Piniak, 2012). Studies indicate that the effective hearing range of sea turtle species is 100 to 800 Hz, with an upper limit of 2 kHz (Bartol et al., 1999; Gedamke et al., 2016). Sea turtles are therefore able to detect much of the intense and prevalent low-frequency sound (50 to 2,000 Hz) in the ocean such as those produced by oil and gas exploration and extraction, low frequency naval sonar, pile driving, and shipping (Piniak, 2012). Little data exist on the behavioral responses of sea turtles to anthropogenic sound; however, several studies have examined the behavioral response of sea turtles to seismic airguns (McCauley et al., 2000; Piniak, 2012). Studied responses include erratic and increased swimming behavior to move away from airguns and increased diving behavior described as a "startle response" (McCauely et al., 2000; Piniak, 2012). A study by McCauley et al. (2000) determined that a reference behavioral disturbance threshold for sea turtles is 166 dB re 1 μPa RMS. The injury threshold for sea turtles is assumed to be 180 dB re 1μPa RMS.

Pile driving occurs over small spatial and relatively short temporal scales (depending on the construction activity) and produces high-intensity, low-frequency sounds that can be detected by sea turtles. Pile driving activities for the Project may overlap with when sea turtles are potentially present in the Project area. Exposure to pile-driving noise could interrupt feeding, resting, or other behaviors or could cause a turtle to change its course of travel. The interruptions might continue for as long as the pile driving continues, or until the sea turtle could swim outside of the zone of influence. Based on Transco's acoustic modeling results, noise from pile driving activities would be expected to exceed both the injury and behavioral disturbance thresholds for sea turtles. Vibratory pile driving is not expected to exceed the 166 dB re 1 μPa behavioral disturbance threshold for sea turtles, but impact pile driving is predicted to exceed the behavioral disturbance threshold within about 2,815 feet (0.5 mile) of the source. The model results predict that the 180 dB re 1 μPa injury threshold for sea turtles would be exceeded up to 328 feet from the source for impact pile driving, and up to 7 feet from the source for vibratory pile driving. Transco anticipates that the time needed to install one pile via vibratory device is approximately 15 minutes of continuous vibration. For impact hammer-driven piles, the anticipated driving time is approximately 38 to 62 minutes per pile, with approximately 3,382 strikes per pile at MP 29.4 of the Ambrose Channel HDD, and approximately 1,920–2,500 strikes per pile at other locations. Transco estimates a total of 72 hours for installation of all 163 piles, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. Additionally, the NMFS-approved observers that would be present during pile driving to observe for marine mammals would also be trained to observe for sea turtles within the 0.62-mile clearance zone. Because of the limited areal extent of impacts, the limited duration of the pile-driving activities, and proposed mitigation, negligible impacts on sea turtles are expected from pile driving noise. Additionally, we have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8).

It is likely that sea turtles would also be able to hear low-frequency underwater noise from construction vessels and possibly experience some minor disturbance. The most likely impacts would be short-term behavioral changes such as diving and evasive swimming, disruption activities, or departure from the area. However, construction vessel noise is not expected to adversely affect sea turtles, given that the noise generated by construction vessels would be similar to the range of engine noise from existing ship traffic associated with the busy Port of New York and New Jersey. As such, we do not expect that the relatively small number of vessels associated with the NESE Project would substantially affect the existing underwater noise environment.

As discussed in section 4.5.2.8, Transco plans to conduct hydrographic surveys to verify bottom features in advance of and concurrent with pipe-laying activities along the Raritan Bay Loop. Within 30 days following the completion of all backfilling activities for the Raritan Bay Loop, Transco would also conduct a hydrographic survey to verify that the contours of the seafloor have been restored. The hydrographic survey equipment used for the Project could include a single- or multi-beam echo sounder, a high-resolution side-scan sonar, and/or a magnetometer. These devices produce pulsed noise at very high frequencies that are well beyond the functional hearing range of sea turtles. A frequency-modulated (chirp) acoustic sub-bottom profiler may also be used during construction to help detect buried features and confirm the final burial depth of the pipeline. The sub-bottom profiler would also operate in a range beyond the functional hearing range of sea turtles. Thus, we conclude that the proposed hydroacoustic surveys are not anticipated to have adverse effects on sea turtles.

Construction activities such as vessel anchoring, pipe laying, trench excavation, HDD pit excavation, and pile driving would disturb the seafloor, and result in the resuspension, transport, and redeposition of bottom sediments. Additionally, sediments that are resuspended during construction activities could release sediment-bound contaminants into the water column. In 2016 and 2017, Transco conducted sediment sampling and sediment chemistry analysis for 75 sites along the proposed Raritan Bay Loop route to evaluate the level and type of contaminants present in the Project area. Additional sediment sampling was conducted in 2018 to assess the chemical characteristics of sediment within the Raritan Bay Channel and Chapel Hill Channel at deeper depths than previously sampled and to determine the suitability of sediments from the proposed clamshell dredging areas for offshore disposal at the HARS. As discussed in section 4.5.2.3, we consider the offshore sampling program conducted by Transco to be sufficient to characterize the chemical properties of sediments disturbed by construction and to evaluate the impact of suspension and redeposition of sediments on aquatic resources. Analysis of vibracore samples collected during the survey indicated that most of the sample sites had at least one contaminant that exceeded upper-level effects thresholds, i.e., New York “Class C” and/or New Jersey “Effects Range – Medium” sediment screening thresholds. These elevated contaminant levels were generally restricted to the upper 3 feet (0.9 meter) of the seafloor. Concentrations of organic contaminants were greater than upper-level effects thresholds at approximately 33 percent of the sample sites. Approximately 83 percent of the sample sites had at least one exceedance of an inorganic (metal) threshold. Exceedances of upper-level effects thresholds for heavy metals (e.g., copper, lead, zinc, mercury), were detected at multiple locations. These included exceedances for mercury at one site; lead and mercury at one site; lead, zinc, and mercury at two sites; and copper, lead, and mercury at one site. These results are consistent with previous findings, such as a 1993/1994 study by the EPA that estimated that approximately 82 percent of the surface sediment in the Lower New York Bay, Raritan Bay, and Sandy Hook Bay complex was enriched with at least one metal from anthropogenic sources (Adams et al., 1998). Of all of Transco's sampling sites, site VC-1, near the Morgan Shore Approach HDD exit, and sites VC-16 and VC-17, near the Raritan Bay Channel crossing, exhibited a greater number of exceedances of established thresholds for several contaminants at all depth intervals and are therefore considered to be representative of the worst-case sediment conditions that could be encountered along the offshore pipeline route. The exceedances at these sample sites were for dioxins, PCBs, certain polycyclic aromatic hydrocarbons, and metals (including mercury). In response to a NYSDEC comment about contaminant modeling, Transco conducted hydrodynamic and contaminant transport modeling for analytes that exceeded Class C thresholds and high Class B concentrations in sediment samples. Table 4.5.2-8 lists the sample sites in New York where Class C and high Class B exceedances were detected, along with the model-predicted maximum concentration at a distance of 500 feet (152 meters) from the proposed sediment disturbing activities. Based on the modeling results, most of the modeled maximum concentrations would generally be expected to meet water quality standards at the edge of a 500-ft mixing zone. The exceptions were for mercury and copper at some locations. However, the contaminant transport modeling conservatively assumed that clamshell dredging would generally occur continuously at a rate of 11,250 ft^3/hr. Transco does not expect the actual rate of dredging in these contaminated areas to exceed 8,450 ft^3/hr, which would reduce dredging-related mercury and copper concentrations in the water column. Additionally, Transco would utilize slower dredging rates as necessary, based on field monitoring, to ensure compliance with the water quality standards for copper and mercury at the edge of the 500-foot mixing zone. As discussed in section 4.5.2.8, the release of sediment-bound contaminants could result in minor impacts on water quality along the proposed pipeline route; however, these effects would be temporary and would subside upon completion of pipeline construction activities and are not expected to adversely affect sea turtles.

Minor releases of hydrocarbons (e.g., fuel, lubricants) during construction could result in impacts on sea turtles. Spills could originate from accidental spills from construction barges or support boats, loss of fuel during fuel transfers, or other accidents such as collisions, allisions, or groundings. The impacts of hydrocarbons are caused by either the physical nature of the material (e.g., physical contamination and smothering) or by its chemical components (e.g., toxic effects and bioaccumulation). These impacts would depend on the depth and volume of the spill, as well as the properties of the material spilled. Inadvertent hydrocarbon spills could affect sea turtles present within the Project area; however, these impacts, if they occur, are expected to be limited to the immediate area and minor, because the offshore vessels would adhere to the USCG marine trash policy and Transco's Spill Plan that includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction vessels (see table 2.3-3). Because of these practices, it is unlikely that sea turtles would be exposed to operational waste, solid debris, or hydrocarbon spills during construction. Sea turtles would also be able to move out of discharge areas that would cause them discomfort or harm.

As discussed in section 4.5.2.8, an inadvertent release of drilling fluid resulting in high turbidity and sedimentation is unlikely, but could temporarily displace sea turtles, act as a barrier to movement, or smother prey items. However, these impacts, if they occur, are expected to be minor and temporary.

Operational activities for the Raritan Bay Loop would include maintaining, inspecting, repairing, and cleaning the pipeline. Within 10 years of being placed into service and every 7 years thereafter, Transco would inspect the Raritan Bay Loop with a smart pig, which does not require the removal of sediment, and would not affect sea turtles or sea turtle prey items. In the event of non-routine in-water maintenance, Transco may need to excavate sediment in a localized area (e.g., potentially through the use of a suction dredge, divers using hand-jetting, or air-lifting equipment). The temporary displacement of these sediments would impact benthic and demersal species in the vicinity, resulting in a minor potential loss of sea turtle prey items. However, the impact on sea turtles would be negligible considering the small area affected, the availability of similar habitat, and the long period of time between non-routine maintenance activities.

Determination of Effect

Construction-related impacts of the Project on sea turtles are expected to be temporary and minor. Vessel traffic would not increase substantially as a result of the Project, so vessel strikes are unlikely. The risk of vessel strikes would be further reduced by Transco's planned use of NMFS-approved observers. Temporary displacement from foraging grounds is not expected to adversely affect sea turtles due to the large amount of similar habitat in the region. It is also unlikely that sea turtles would be injured by the noise of any construction activities associated with the NESE Project, but they may avoid areas close to noise-generating activities. Discomfort caused by construction noise would be of short duration and reduced by Transco's proposed mitigation measures. Based on the green, Kemp's ridley, leatherback, and loggerhead sea turtles' characteristics and habitat requirements, the Project's proposed construction and operation procedures, and Transco's proposed mitigation methods, we conclude that the Project *may affect, but is not likely to adversely affect* these sea turtle species.

4.6.3.5 Fish

Atlantic Sturgeon

The Atlantic sturgeon is a subtropical species that can be found along the Atlantic coast from Labrador, Canada to Florida (Murdy et al., 1997; ASMFC, 2017b). The Atlantic sturgeon is a federally listed species with five DPSs, one of which is listed as threatened, and four of which are listed as endangered (NMFS, 2017k). The species is also state-listed as endangered in New Jersey (NJDEP, 2017c) and state-listed by reference in New York (6 NYCRR Part 182.3a). The five DPS of Atlantic sturgeon (i.e., the New York Bight, Gulf of Maine, Chesapeake Bay, Carolina, and South Atlantic DPS) are grouped by ranges according to designations published by the NMFS on February 6, 2012 (77 Federal Register 5880; 77 Federal Register 5914). The Gulf of Maine DPS is listed as federally threatened and includes all anadromous Atlantic sturgeon that are spawned in the watersheds from the Maine/Canadian border, and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, Massachusetts. Within this range, Atlantic sturgeon have been documented in the Penobscot, Kennebec, Androscoggin, Sheepscot, Saco, Piscataqua, Presumpscott, and Merrimac Rivers (77 Federal Register 5880). The New York Bight DPS is federally endangered and includes all anadromous Atlantic sturgeon that are spawned in the watersheds that drain into coastal waters from Chatham, Massachusetts to the Delaware-Maryland border on Fenwick Island, Delaware. Within this range, Atlantic sturgeon have been documented in the Hudson and Delaware Rivers as well as at the mouth of the Connecticut and Taunton Rivers, and throughout Long Island Sound (77 Federal Register 5880). The Chesapeake Bay DPS is listed as federally endangered and includes all anadromous Atlantic sturgeon that are spawned in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, Virginia. Within this range, Atlantic sturgeon have been documented from the James, York, Potomac, Rappahannock, Pocomoke, Choptank, Little Choptank, Patapsco, Nanticoke, Honga, and South Rivers as well as the Susquehanna Flats (77 Federal Register 5008). The Carolina DPS is listed as federally endangered and includes all Atlantic sturgeon that are spawned in the watersheds along the southern Virginia, North Carolina, and South Carolina coastal areas to Charleston Harbor (77 Federal Register 5914). The South Atlantic DPS is listed as federally endangered and includes all Atlantic sturgeon spawned in the watersheds (including all rivers and tributaries) of the Ashepoo, Combahee, and Edisto Basin southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River in Florida (77 Federal Register 5914). Aggregations of the New York Bight DPS are closest to the Project area, with spawning populations found in the Hudson and Delaware Rivers, but the ranges of the other four DPS also overlap this area. Consequently, individuals from all of the five DPS could potentially occur in the New York Bight. Critical habitat was recently designated for Atlantic sturgeon (82 Federal Register 39160). The critical habitat closest to the Action Area is the Hudson River from the Troy Lock and Dam downstream to where the main stem river discharges at its mouth into New York City Harbor. This critical habitat is more than 2 miles (3.2 kilometers) from the nearest transit route proposed for Project-related vessels.

Atlantic sturgeon are anadromous, migrating into freshwater rivers to spawn in the spring and early summer, and migrating downriver in the summer or fall to reside in estuarine and marine waters (NMFS, 2017k; NYSDEC, 2017c; Atlantic Sturgeon Status Review Team, 2007). For the purposes of this draft BA, "juveniles" are considered to be river residents that have not left their natal river and "sub-adults" are considered to be non-mature individuals who have made their first migration outside of their natal river. When not spawning, it is common for Atlantic sturgeon to migrate long distances from their spawning rivers; during this time period they generally inhabit shallow nearshore areas with mainly gravel and sand substrates (NMFS, 2017k). They are benthic feeders, and typically consume benthic invertebrates such as crustaceans, worms, and mollusks. Atlantic sturgeon once supported a major commercial fishery in the region, but the population collapsed due to overharvest and has been slow to recover (NYSDEC, 2017c). Although harvest of the species has been banned since the 1998, other threats remain, including habitat degradation; habitat impediments (e.g., locks, dams); vessel strikes; and accidental capture, injury, and mortality in other fisheries (i.e., bycatch) (NMFS, 2017k).

A stock assessment of Atlantic sturgeon was recently completed for the U.S. Atlantic coast (ASMFC, 2017c). This assessment concluded that the overall Atlantic sturgeon population remains depleted relative to historic levels, but appears to be stable or slowly increasing since the 1998 harvest moratorium. Results at the DPS level were more variable, but generally suggested increasing abundance for all DPSs except the Gulf of Maine and Chesapeake Bay DPSs. Assessment data also suggest that recovery rates may be hindered by anthropogenic sources of mortality such as bycatch and vessel strikes.

In New York waters, Atlantic sturgeon aggregations have been found to be generally restricted to depths less than 66 feet (20 meters), with peak abundance occurring during the spring and fall (Dunton et al., 2015). Sub-adult Atlantic sturgeon also show a strong habitat preference for coastal waters less than 66 feet (20 meters) deep (Dunton et al., 2010). Atlantic sturgeon aggregation areas have been documented off of Sandy Hook, New Jersey and Rockaway, New York. Based on two separate New York State bottom trawl surveys completed between 2005 and 2007, Dunton et al. (2010) found that 85 percent of the captured Atlantic sturgeon were caught at depths between 16 to 33 feet (5 to 10 meters). In spring samples, 57 percent of the Atlantic sturgeon were captured off Rockaway, New York. In fall samples, the Rockaway region accounted for 70 percent of the catches. In NJDEP finfish surveys conducted between 1988 and 2007, catches of Atlantic sturgeon were highest for the 33- to 49-foot (10- to 15-meter) depth range, with 95 percent of all catches occurring in depths less than 20 meters (Dunton et at., 2010). In winter samples, 80 percent of the Atlantic sturgeon captured were from within a small area off of Sandy Hook, New Jersey. The available information suggests that adult and sub-adult Atlantic sturgeon would likely be present in portions of the Project area year-round, with the highest concentrations in spring and fall. Atlantic sturgeon eggs, larvae, and juveniles are not expected to be present in the Project area, as spawning takes place in freshwater habitats outside of the Project area.

<u>Potential Impacts</u>

Principal stressors that could directly affect Atlantic sturgeon include noise, vessel strikes, exposure to resuspended contaminants, seafloor disturbance, and impingement. Atlantic sturgeon could also be affected by interaction with construction equipment, inadvertent hydrocarbon spills, and inadvertent releases of drilling fluid. Consequences of these stressors range from temporary disruption of normal behaviors to injury or mortality. To minimize potential impacts on Atlantic sturgeon, construction would be restricted from March 1 through June 30 from MP 12.0 to 14.25 and MP 30.0 to 35.5 and from October 1 through November 30 from MP 30.0 to 35.5. Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during the timing restriction windows, and has requested that some low-impact activities take place during the timing restriction windows due to construction schedule constraints. These flexibility requests are summarized in table 4.5.2-7. The NYSDEC and the NMFS preliminarily indicated that they would allow hand jetting and HDD pit excavation activities in the spring, and that dredging activities between MPs 30.0 and 35.5 could be conducted between March 1 and April 30 if Atlantic sturgeon were not present in the area, as predicted by water temperature and confirmed by acoustic monitoring. Transco will continue to consult with the NYSDEC and the NMFS regarding the details of the acoustic monitoring. As the timing restriction windows and allowable work have not been finalized, we have included a recommendation in section 4.5.2.8 that Transco provide documentation of agency approval for timing restrictions and allowable work prior to construction.

Relatively little is known about the effects from exposure to underwater sound on fish (Popper and Hastings, 2009). Even in cases where data are available, most experts recommend caution in attempting to extrapolate between species (Popper and Hastings, 2009). The lack of metrics and thresholds creates a high degree of uncertainty regarding the potential for an individual project to injure fishes (Stadler and Woodbury, 2009). Because of this uncertainty, a working group of federal and state agencies, underwater acoustic experts, and fish biologists developed interim criteria for the onset of physical injury to fishes exposed to underwater sounds generated by impact pile driving (Stadler and Woodbury, 2009). The interim criteria used two metrics including peak sound pressure level and sound exposure level. The interim criteria suggested that onset of physical injury would be expected if either the peak sound pressure level exceeds 206 dB (re 1 μPa) or the sound exposure level, accumulated over all pile strikes generally occurring within a single day, exceeds 187 dB (re 1 $\mu Pa^2 \cdot sec$) for fishes 2 grams or larger, or 183 dB for smaller fishes (Stadler and Woodbury, 2009). To assess behavioral disturbance, the NMFS has adopted a threshold criterion of 150 dB re 1 μPa RMS for fish of all sizes (Andersson et al., 2007; Purser and Radford, 2011; Wysocki et al., 2007).

Sturgeon are hearing generalists and use particle motion to detect sounds (Lovell et al., 2005). The range of hearing capability for sturgeon species is approximately 100 Hz to 1 kHz (Popper, 2005). Fish with swim bladders (like Atlantic sturgeon) are generally considered to be more vulnerable to noise, which can rapidly expand and contract the swim bladder and rupture capillaries (California Department of Transportation, 2001). However, the physiological effects of pile driving noise on Atlantic sturgeon may actually be less than those of other species due to the small size of Atlantic sturgeon's swim bladder. This is because the potential for tissue damage from rapid expansion of the swim bladder is likely reduced when the swim bladder occupies less of the body cavity and does not have as much contact with body tissue (NMFS, 2012b). Previous pile driving projects have reported fish mortality related to impact pile driving involving 8-foot-diameter steel pipe piles, although other projects involving smaller diameter piles and caged salmon as close as 2 feet from the piles did not report any fish mortality (NMFS, 2012c).

Based on Transco's acoustic modeling results, the noise generated by pile driving would exceed both the injury and behavioral disturbance thresholds for fish. The 150 dB re 1 μPa behavioral disturbance threshold for fish would be exceeded up to 705 feet from the source for vibratory pile driving, and up to 32,808 feet (6.2 miles) from the source for impact pile driving. Pile driving would exceed the 206 dB re 1 μPa peak sound pressure injury threshold for fish within a limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving ranged from 3,271 to 7,037 feet (0.6 to 1.3 miles). However, an individual fish would need to remain within this area during the entire duration of the pile driving event to experience an injury. Additionally, these zones would be constricted by land, and some of the pile driving noise is likely to be masked by ambient noise at distances shorter than those predicted by the noise modeling. The installation and removal of the piles would occur over a relatively short period at any given location. Transco anticipates that the time needed to install one pile via vibratory device is approximately 15 minutes of continuous vibration. For impact hammer-driven piles, the anticipated driving time is approximately 38 to 62 minutes per pile, with approximately 3,382 strikes per pile at MP 29.4 of the Ambrose Channel HDD, and approximately 1,920–2,500 strikes per pile at other locations. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. Atlantic sturgeon are likely to move away from the area before noise levels from the pile driving exceed the behavioral disturbance or injury thresholds, but given the size of the potential zones of ensonification exceeding the injury threshold for cumulative exposure, harassment or injury of Atlantic sturgeon is possible. Transco proposes to complete all pile installation and removal activities during the months of June, July, and August, which would minimize pile driving noise impacts on Atlantic sturgeon during peak spring and fall migration periods.

Transco expects that the jet trencher would produce sound levels up to 150 dB re 1 μPa at 6 to 10 feet (2 to 3 meters) from the source at start-up. After the jet trencher "swords" penetrate the seafloor, the noise would be dampened and is expected to drop to 110 dB re 1 μPa. Disturbance of Atlantic sturgeon by jet trencher noise would be limited to within 10 feet from the jet trencher at start-up. Additionally, the jet trencher would advance at a rate of approximately 246 feet per hour (75 meters per hour) such that vessel noise from this activity potentially exceeding 150 dB re 1 uPa RMS would affect a single location for less than a few hours. Hand jetting equipment operated at a pressure of 412 bar has been documented to produce sound levels between 135 dB and 171 dB re 1 μPa at approximately 3.3 feet (1 meter) from the source (Molvaer and Gjestland, 1981). Transco estimates that noise generated by hand jetting could exceed the 150 dB threshold within up to 77 feet (23.4 meters) from the source. The construction activity of greatest duration would be the hand-jetting that would occur seaward of the Rockaway Peninsula at the Neptune cable crossing (MP 35.19). Transco estimates that this activity would last for about 11.6 days, with multiple daily breaks for crew shift changes.

Construction vessels could generate underwater noise that peaks between 140 to 180 dB re 1 μPa at 3.3 feet (1 meter) at frequencies between 0.1 and 1 kHz (LGL and JASCO, 2005). These noises could be audible to Atlantic sturgeon in proximity to transiting vessels. Assuming a worst-case peak source level of 180 dB, Transco estimates that the noise generated by construction vessels could exceed the behavioral disturbance threshold for Atlantic sturgeon within approximately 83 feet (25.3 meters) from the source. However, the noise generated by these vessels would be similar to the range of engine noise from existing ship traffic associated with the busy Port of New York and New Jersey. As such, we do not expect that the relatively small number of vessels associated with the Project would substantially affect the existing underwater noise environment.

While construction and vessel noise levels may cause Atlantic sturgeon to avoid the immediate area, individuals would not be permanently deterred from foraging in the affected area following the relatively short-term noise-generating activities. It is possible that sturgeon could be attracted to the construction area for foraging purposes if prey items are stirred up from the sediments during construction activities. In this case, Atlantic sturgeon could possibly remain within the area of acoustic disturbance during pile driving, jet trenching, and/or hand jetting activities. The potential effects of construction noise on Atlantic sturgeon would be limited based on the relatively short time frame of the activities and Transco's adherence to time of year restrictions for Atlantic sturgeon, but harassment or injury is possible. We have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with the predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8). Therefore, noise impacts of pile driving, jet trenching, hand jetting, and construction vessel activities on Atlantic sturgeon are expected to be minor and temporary.

As discussed in section 4.5.2.8, Transco plans to conduct hydrographic surveys to verify bottom features in advance of and concurrent with pipe-laying activities along the Raritan Bay Loop. Within 30 days following the completion of all backfilling activities for the Raritan Bay Loop, Transco would also conduct a hydrographic survey to verify that the contours of the seafloor have been restored. The hydrographic survey equipment used for the Project could include a single- or multi-beam echo sounder, a high-resolution side-scan sonar, and/or a magnetometer. These devices produce pulsed noise at very high frequencies that are well beyond the functional hearing range of Atlantic sturgeon. A frequency-modulated (chirp) acoustic sub-bottom profiler may also be used during construction to help detect buried features and confirm the final burial depth of the pipeline. The sub-bottom profiler would also operate a range beyond the functional hearing range of Atlantic sturgeon. Thus, we conclude that the proposed hydroacoustic surveys are not anticipated to have adverse effects on Atlantic sturgeon.

Construction activities are not expected to generate a large amount of increased vessel traffic in the Project area relative to existing traffic associated with the Port of New Jersey and New York (see section 4.8.7.3). As previously stated, construction of the offshore pipeline is expected to last up to 9 months, with offshore construction activities potentially occurring 24 hours a day, 7 days a week. Over the 9-month construction period, the average number of Project-related construction vessels working in the area would be about 20 vessels, with a maximum of 40 vessels. Additional traffic would occur due to Project-related vessels transiting to and from the HARS. Not all deployed vessels would be transiting each day, as some would be stationed in the offshore and only occasionally return to dock to refuel or due to unfavorable weather conditions. Project-related vessels (and their typical drafts) are described in section 2.3.3.1 and table 2.3.3-2. Vessel traffic would temporarily increase in the Arthur Kill, Newark Bay, Kill Van Kull, Upper New York Bay, and Lower New York Bay, as construction and support vessels transit from the existing contractor yard in Elizabeth, New Jersey, to destinations along the offshore pipeline route. Transco has also proposed the use of an additional contractor yard in Bayonne, New Jersey. This contractor yard is closer to the offshore Project workspace, has more direct access than the contractor yard in Elizabeth, and would avoid increasing vessel traffic along the Arthur Kill or Kill Van Kull waterways. Transco's proposed vessel transit routes do not occur within Atlantic sturgeon critical habitat. After transiting to a work site, construction vessels would either progress slowly along the pipeline route (e.g., during pipelay) or be temporarily stationed at a single work site (e.g., during HDD pit excavation). At any given location along the proposed offshore pipeline route, the time needed for construction activities would range from a few hours to a few weeks, and would likely include several breaks in activity due to crew shift changes, weather windows, etc.

Factors relevant to determining the risk to Atlantic sturgeon from vessel strikes are currently unknown, but may be related to the size and speed of vessels, navigational clearance (i.e., depth of water and draft of vessels), and the behavior of Atlantic sturgeon (e.g., foraging, migrating) in areas where vessels are operating (NMFS, 2013a). Large vessels have been implicated because of their deep draft (up to 40 to 45 feet) relative to smaller vessels (draft of about 15 feet), which increases the probability of vessel collisions with demersal fishes like sturgeon, even in deep water (Brown and Murphy, 2010). Smaller vessels and those with relatively shallow drafts provide more clearance with the bottom which reduces the probability of strikes. The depths along Transco's proposed vessel transit routes are approximately 50 feet (15.2 meters), and the deepest anticipated draft of Project-related vessels is 18 feet (5.5 meters). Because the Project-related construction vessels would have relatively shallow drafts, the chances of vessel-related mortalities are reduced. It is also important to note that Atlantic sturgeon vessel strikes have only been identified as a significant concern in the Delaware and James Rivers. Current data suggest that there may be unique geographic features of the Delaware and James Rivers (e.g., narrow migration corridors combined with shallow/narrow river channels) that increase the risk of interactions between vessels and Atlantic sturgeon (NMFS, 2013a). Construction of the NESE Project would result in an increase in vessel traffic, but the effect would be small and localized relative to existing traffic into and out of the Port of New Jersey and New York. While the area off Rockaway Beach is a known Atlantic sturgeon aggregation area, the species remains near the seafloor when foraging and would not likely come into contact with construction vessels at these times. Also, Project vessels 65 feet (19.8 meters) or longer would travel at speeds no greater than 10 knots (11.5 mph) from November 1 to April 30 near this aggregation area due to the speed restrictions associated with the North Atlantic right whale SMA (see figure 4.6.3-1). Sturgeon could be found in the water column when migrating through the area, but the relatively shallow draft of construction vessels, the resulting navigational clearance, and the slow movement of transiting vessels would limit the potential for vessel strikes on migrating Atlantic sturgeon. For these reasons, vessel traffic associated with the Project is not expected to adversely affect Atlantic sturgeon.

Because Atlantic sturgeon are bottom feeders, individuals may be at risk of injury or mortality from direct interactions with construction equipment operating on the seafloor. There have been no studies directly addressing the interactions between Atlantic sturgeon and jet trenchers, hand jets, clamshell dredges, or suction dredges, and we are unaware of any reported interactions between sturgeons and jetting or suction dredging operations. In 2012, the USACE provided the NMFS with a list of all documented interactions between mechanical dredges and sturgeon reported along the east coast of the U.S. from as far back as 1990 (USACE, 2012c). This report identified four incidences of sturgeon being captured in dredge buckets. One of these was in the Cape Fear River and the other three were at the Bath Iron Works facility in the Kennebec River, Maine. The risk of interactions between sturgeon and dredges is thought to be highest in areas where sturgeon are known to aggregate, such as overwintering sites or foraging concentrations (NMFS, 2013a). The risk of capture may also be related to the behavior of sturgeon in the area. While foraging, for example, sturgeon are at the bottom of the waterbody interacting with the sediment; this behavior may increase susceptibility to capture in a dredge bucket (NMFS, 2013a). Atlantic sturgeon do not appear to display a fear response, so sturgeon in the path of the jet trencher or clamshell dredge bucket during construction of the Project may not be sufficiently disturbed to move away. Further, the jetting and dredging may stir up benthic prey items buried within sediments that could attract Atlantic sturgeon to the area while equipment is operating. This could increase the potential for direct interaction between the jetting and dredging equipment with individual Atlantic sturgeon. There may also be a risk of impingement of sturgeon on the intakes of jetting and dredging equipment, although we are unaware of any studies which have documented such an occurrence using equipment similar to what would be used for the Project. In previous BOs, the NMFS has determined that non-hopper type dredging methods like clamshell dredging are slower than hopper-type dredging methods and are unlikely to overtake or adversely affect Atlantic sturgeon. The NMFS concluded that the chance of injury or death from interactions with clamshell and/or hydraulic dredging equipment is discountable due to the highly mobile nature of the species (NMFS, 2015b). Thus, interactions between Atlantic sturgeon and construction equipment are possible, though in the event of an interaction, we do not expect that Atlantic sturgeon would be at serious risk of injury or mortality from these activities due to the slow rates of movement of the dredging and jetting equipment. Hand-jetting activities would be diver-assisted and would occur at a slower rate than jet trenching. We conclude that adverse effects on Atlantic sturgeon from interaction with construction equipment are unlikely and discountable.

Increases in turbidity associated with construction activities are not expected to affect Atlantic sturgeon. Sub-adult and adult Atlantic sturgeon are frequently found in turbid water and are capable of avoiding sediment plumes by swimming higher in the water column (NMFS, 2012c). Laboratory studies (Niklitschek, 2001; Secor and Niklitschek, 2001) have demonstrated that shortnose sturgeon are able to avoid areas with unfavorable water quality conditions and that they seek out more favorable conditions when available. This behavior has also been observed in Atlantic sturgeon (NMFS Northeast Region, 2012b). Based on Project-specific sediment transport modeling conducted by Transco (see section 4.5.2.8), TSS concentrations exceeding 100 mg/L above ambient conditions would not extend more than 1,345 feet from the source for excavation activities east of Ambrose Channel or more than 5,151 feet from the source for backfilling activities east of Ambrose Channel, which would be in or near an Atlantic sturgeon aggregation area. While an increase in suspended sediments may cause sturgeon to alter their normal movements, these changes in behavior are not expected to result in adverse effects. As discussed in section 4.6.3.4, sediments that are resuspended during construction activities could release sediment-bound contaminants into the water column. The release of sediment-bound contaminants could result in minor impacts on water quality along the proposed pipeline route; however, these effects would be temporary and would subside upon completion of pipeline construction activities. Additionally, Atlantic sturgeon in the Project area are likely exposed to higher levels of contaminants in their riverine habitats, particularly the Hudson River, than they would be during construction. Tissue levels of total PCBs and total dioxins/furans have been documented to be higher in shortnose sturgeon and Atlantic sturgeon from the Hudson River than conspecifics from cleaner estuaries (Chambers et al., 2012). Adverse impacts on Atlantic sturgeon from encounter with resuspended contaminants are not expected, given the relatively short duration of sediment plumes and the existing ambient contaminant exposure during the Atlantic sturgeon life-cycle.

Construction of the Project would result in the direct disturbance of approximately 87.8 acres of the seafloor (see section 2.2.1.2). An additional 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.3 centimeter of sediments disturbed by the offshore construction activities. Atlantic sturgeon prey includes crustaceans, marine worms, and bivalve shellfish, which are known to occur in the vicinity of the offshore pipeline route. The benthic community within this area likely is similar to that of other shallow, sandy habitats in the New York Bight. Bottom-disturbing activities, such as use of the jet trencher and dredges, could reduce the amount of important prey items for Atlantic sturgeon in the offshore work area. Trench excavation, turbidity, and redeposition of sediments during construction may bury benthos, but the affected area would be only a small portion of the New York Bight, which encompasses about 31,276 square miles or over 20 million acres. Additionally, as described in section 4.5.2.8, the benthic community is expected to recover quickly, likely within 1 to 3 years after construction. We have also recommended that Transco file a 5-year post-construction benthic sampling and monitoring plan to ensure that benthic communities recover as expected (see section 4.5.2.8). Based on the short duration of construction and the expected rapid rate of benthic community recovery in the disturbed area, effects on Atlantic sturgeon prey assemblages would be minor and temporary. During and directly following construction, Atlantic sturgeon could continue feeding in the greater region, including the area immediately surrounding the location of direct and indirect impact from construction. Additionally, operation of the Raritan Bay Loop would not permanently deter Atlantic sturgeon from returning to the area. Following recovery of the benthic assemblages, Atlantic sturgeon could resume feeding in the areas affected by construction.

Individual Atlantic sturgeon could be impinged during the intake of seawater for the hydrostatic testing, but this is unlikely. Impingement of sturgeon has been reported at intakes at nuclear power facilities. Specifically, the NMFS found relatively small numbers of impinged Atlantic sturgeon (average of 11.5 Atlantic sturgeon per year from 1985 to 1990) on intakes for a nuclear facility with flow rates ranging from about 1 million to 1.8 million gpm (NMFS, 2013b). This is approximately 426 to 766 times the anticipated intake rate for the NESE Project, which would use a total of approximately 3,489,482 gallons of water withdrawn at a rate of about 2,350 gpm. Additionally, Transco would reduce the potential for impingement by positioning the water intakes approximately 10 feet (3 meters) below the surface in water depths greater than 20 feet. In water depths shallower than 20 feet (6 meters), Transco would position the water intake at mid-depth in the water column. Transco would also use screens on the intakes to reduce the number of organisms entrained within the pipeline. This intake screen would have a mesh opening of 0.0029 inch (0.07 millimeter). Impingement impacts on Atlantic sturgeon are discountable due to the position of the intake off the seafloor, the small area likely to be influenced by the intake, and the short duration of the withdrawal operation. Additionally, healthy sturgeon are strong swimmers. Based on the study of sturgeon impingement at water intakes for the nuclear facility (NMFS, 2013b), adult and sub-adult Atlantic sturgeon present near the intake for hydrostatic test water during construction of the Project should be able to escape the flow of water into the intake given the relatively slow rate of withdrawal. The discharge of seawater and the use of chemical additives (e.g., the corrosion inhibitor CORRTREAT 15316 and the fluorescent dye Hydro Tag Clear) in the hydrostatic test water would not be expected to adversely affect Atlantic sturgeon. As discussed in section 4.5.2.8, the concentrations of CORRTREAT 15316 and Hydro Tag Clear proposed for discharge in the hydrostatic test water would not be expected to bioaccumulate in aquatic food webs or result in adverse impacts on aquatic organisms. Following the completion of each test, the water would be discharged back into the marine environment through a multi-port diffuser in accordance with applicable standards and permits, such as the New York State water quality standards. The test water would be pumped back into the marine environment at a rate of 2,350 gpm. This would re-oxygenate and mix the discharged water with the surrounding sea water thereby dispersing (diluting) the concentration of chemical additives in the test water. The resulting concentrations of additives and the discharge of test water would not be expected to cause adverse effects on Atlantic sturgeon.

Atlantic sturgeon could potentially be exposed to operational waste, solid debris, or hydrocarbon spills during construction, but this is unlikely because the offshore vessels would adhere to the USCG marine trash policy and Transco's Spill Plan that includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction vessels (see table 2.3-3).

As discussed in section 4.5.2.8, an inadvertent release of drilling fluid resulting in high turbidity and sedimentation is unlikely, but could temporarily alter the movements of Atlantic sturgeon or smother prey items. However, these impacts, if they occur, are expected to be minor and temporary.

Operational activities for the Raritan Bay Loop would include maintaining, inspecting, repairing, and cleaning the pipeline. Within 10 years of being placed into service and every 7 years thereafter, Transco would inspect the Raritan Bay Loop with an intelligent pig, which does not require the removal of sediment, and would not affect Atlantic sturgeon or Atlantic sturgeon prey items. In the event of non-routine in-water maintenance, Transco may need to excavate sediment in a localized area (e.g., potentially through the use of a suction dredge, divers using hand-jetting, or air-lifting equipment). The temporary displacement of these sediments would impact benthic and demersal species in the vicinity, resulting in a minor potential loss of Atlantic sturgeon prey items. However, the impact on Atlantic sturgeon would be negligible considering the small area affected, the availability of similar habitat, and the long time period between maintenance activities.

<u>Determination of Effect</u>

We conclude that Atlantic sturgeon from the New York Bight DPS are most likely to occur in the vicinity of the Project, and that Atlantic sturgeon from other DPS also have the potential to occur in the area. Atlantic sturgeon occurrences within the Rockaway region typically peak between April and June and consist mostly of sub-adults. A smaller aggregation of Atlantic sturgeon returns to the area during the fall (September to November). To minimize potential impacts on Atlantic sturgeon, construction would be restricted from March 1 through June 30 from MP 12.0 to 14.25 and MP 30.0 to 35.5 and from October 1 through November 30 from MP 30.0 to 35.5. However, Transco has requested that some low-impact activities take place during the timing restriction windows due to construction schedule constraints. As such, we have recommended that Transco provide documentation of agency approval for timing restrictions and allowable work prior to construction (see section 4.5.2.8.) We conclude that vessel traffic associated with the Project would not affect Atlantic sturgeon. Though pile installation and removal activities would occur outside of peak spring and fall migration periods, we conclude that harassment or injury of Atlantic sturgeon is possible due to the size of the potential zones of ensonification exceeding the injury threshold for cumulative exposure. As noted above, we have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8). Bottom-disturbing activities such as dredging and jet-trenching have the potential to affect Atlantic sturgeon by removing and disturbing prey species, causing sturgeon that are deterred from feeding within the construction area to move to nearby unaffected areas. Sturgeon may also be affected by potential interactions with the clamshell dredge, jet trencher, hydrostatic test water intake, and other equipment, but these interactions are unlikely and effects are discountable. Based on the analysis presented above, we conclude that the NESE Project *may affect, and is likely to adversely affect* the Atlantic sturgeon.

Shortnose Sturgeon

The shortnose sturgeon is a federally listed endangered species and state-listed endangered species in New York and New Jersey (NMFS, 2017n; NYSDEC, 2017b; NJDEP, 2017c). It is a large, long-lived anadromous species that primarily inhabits slow-moving riverine, estuarine, and marine nearshore habitats. Unlike other anadromous species, they do not appear to undertake long-distance offshore migrations (NMFS, 2017n). Shortnose sturgeon are benthic feeders, consuming primarily crustaceans, mollusks, annelid worms, and insects (NMFS, 2017n; FWS, 1997). In the New York Bight, shortnose sturgeon are found in the lower portion of the Hudson River from the southern tip of Manhattan upriver to the dam at Troy, New York (FWS, 1997). In the Hudson River, shortnose sturgeon spawn from April to May, migrating upriver from their overwintering area in the mid-Hudson near Kingston, New York to freshwater spawning sites north of Coxsackie, New York (NYSDEC, 2017d; Shortnose Sturgeon Status Review Team, 2010). Although shortnose sturgeon occur in most major river systems along the eastern U.S. coast (NMFS, 2017n), the Hudson River population is thought to be the largest and healthiest riverine population (Shortnose Sturgeon Status Review Team, 2010). Current threats to the shortnose sturgeon include pollution, habitat alteration, dams, dredging, and other development activities (NMFS, 2017n). Critical habitat has not been designated for shortnose sturgeon.

Shortnose sturgeon are not expected to be present in Raritan Bay, Lower New York Bay, or the Atlantic Ocean. In Upper New York Bay, consistent, low numbers of shortnose sturgeon have been collected since 2004 during an annual winter survey for striped bass (Shortnose Sturgeon Status Review Team, 2010). As such, the species may occur in portions of the Upper New York Bay crossed by Project vessel transit routes.

<u>Potential Impacts</u>

Principal stressors that could directly affect shortnose sturgeon are vessel strikes and inadvertent hydrocarbon spills. Consequences of these stressors range from temporary disruption of normal behaviors to injury or mortality.

Construction activities are not expected to generate a large amount of increased vessel traffic in the Project area. Over the 9-month construction period, the average number of Project-related construction vessels working in the area would be about 20 vessels, with a maximum of 40 vessels. Additional traffic would occur due to Project-related vessels transiting to and from the HARS. Not all deployed vessels would be transiting each day, as some would be stationed in the offshore and only occasionally return to dock to refuel or due to unfavorable weather conditions. Project-related vessels (and their typical drafts) are described in section 2.3.3.1 and table 2.3.3-2. Vessel traffic would temporarily increase in the Arthur Kill, Newark Bay, Kill Van Kull, Upper New York Bay, and Lower New York Bay, as construction and support vessels transit from the existing contractor yard in Elizabeth, New Jersey, to destinations along the offshore pipeline route. Transco has also proposed the use of an additional contractor yard in Bayonne, New Jersey. This contractor yard is closer to the offshore Project workspace, has more direct access than the contractor yard in Elizabeth, and would avoid increasing vessel traffic along the Arthur Kill or Kill Van Kull waterways. Information on the effects of vessel operations on shortnose sturgeon is extremely limited. No information is available on the rate of interactions with vessels, or the characteristics of vessels most likely to result in shortnose sturgeon interactions. It is generally assumed that shortnose sturgeon movements are limited to the bottom of the water column and that vessels operating with sufficient navigational clearance would not pose a risk of ship strike (NMFS, 2013a). The depths along Transco's proposed vessel transit routes are approximately 50 feet (15.2 meters), and the deepest anticipated draft of Project-related vessels is 18 feet (5.5 meters). Shortnose sturgeon are thought to be less susceptible to ship strikes than Atlantic sturgeon due to their smaller size, though anecdotal evidence of propeller wounds suggest shortnose sturgeon at least occasionally interact with vessels (NMFS, 2013a). Construction of the Project would result in an increase in vessel traffic, but the effect would be small and localized relative to existing traffic into and out of the busy Port of New Jersey and New York. Sturgeon could be found in the water column when migrating through the vessel transit routes, but the navigational clearance and the slow movement of transiting vessels would limit the potential for vessel strikes on shortnose sturgeon. For these reasons, vessel traffic associated with the Project is not expected to adversely affect shortnose sturgeon.

Shortnose sturgeon could potentially be exposed to operational waste or solid debris during construction, but this is unlikely because the offshore vessels would adhere to the USCG marine trash policy and Transco's Spill Plan that includes measures that would be implemented to identify, control, and clean up any accidental leaks or spills from offshore construction vessels (see table 2.3-3).

Operation of the Raritan Bay Loop would not adversely affect shortnose sturgeon.

<u>Determination of Effect</u>

Shortnose sturgeon are unlikely to be found in the offshore Project area, in the vicinity of the proposed contractor yard in Elizabeth, New York, or along the construction and support vessel transit routes traversing the waters of Newark Bay, Kill Van Kull, Arthur Kill, or Lower New York Bay. However, shortnose sturgeon may be present in the vicinity of the proposed contractor yard in Bayonne, New Jersey, and where the Project vessel transit routes cross Upper New York Bay. Collisions between these vessels and shortnose sturgeon are possible, but unlikely. This is due to the depth of the water in the Upper New York Bay along the transit route and the relatively shallow draft of Project-related construction vessels, which would provide ample room for fish to pass under the vessels, and also by the slow movement of the transiting vessels. We additionally note that the Upper New York Bay is a heavily trafficked area associated with the Port of New Jersey and New York, so sturgeon in this area would be accustomed to vessel traffic. For these reasons, we conclude that the Project *may affect, but is not likely to adversely affect* shortnose sturgeon.

4.6.3.6 Federally Listed Species Conclusions

As shown in tables 4.6.3-1 and 4.6.3-2, we have determined that the Project would have no effect on 7 federally listed species; may affect, but is not likely to adversely affect 12 federally listed species; may affect, and is likely to adversely affect 3 federally listed species; and may affect, but is not likely to jeopardize 1 federally proposed threatened species. However, we have not yet completed our consultations with the NMFS for federally listed species. Therefore, **we recommend that:**

- **Transco should <u>not begin construction</u> activities <u>until</u>:**
  - **a. FERC staff receives comments from the NMFS regarding the proposed action;**
  - **b. FERC staff completes formal ESA consultation with the NMFS, if required; and**

c. **Transco has received written notification from the Director of OEP that construction or use of mitigation may begin.**

4.6.4 State Listed Species

Transco consulted with Pennsylvania, New Jersey, and New York state resource agencies to identify state-listed species that could potentially occur within the Project area. State-listed species that are also federally listed are discussed in section 4.6.3 above and are not discussed further in this section.

Our analysis of the potential for the Project to impact the 25 state-listed species and our determination of effect for each of these species are discussed in the following sections. State-listed species potentially occurring in the Project area are listed in table 4.6.4-1.

4.6.4.1 Pennsylvania

Transco's consultations with the PAFBC, PADCNR, and PAGC regarding review of the NESE Project facilities in Pennsylvania for potential impacts on species and resources of concern identified one state-listed threatened plant species and one state-listed threatened fish species that may occur along the Quarryville Loop in Pennsylvania. A summary of surveys and/or proposed mitigation is discussed below.

The American holly is an evergreen shrub or small tree that grows to 50 feet in height and can be easily recognized year-round by its alternately arranged, thick evergreen leaves that have a sharp spine at the tip and additional spines along the margin (PADCNR, 2017b). In Pennsylvania, American holly occurs mostly in the southeastern counties and grows on wooded slopes and streambanks. The PADCNR requested that Transco conduct surveys for this species along the Quarryville Loop using a PADCNR-approved biologist. Transco conducted surveys of the Quarryville Loop in August 2016 to determine the presence or absence of American holly. Surveys identified 10 areas of potentially suitable habitat and recorded 46 individuals within 3 of those areas (between MPs 1681.0 and 1681.5, and MPs 1686.5 and 1686.7), with 2 individuals located within the proposed Project workspace. In a letter dated February 27, 2017, the PADCNR concluded that impacts on the two individuals would not adversely affect the species as a whole and no further coordination is necessary for the Project. In a September 26, 2017 letter responding to Transco's request for an updated review due to changes to the project workspace, the PADCNR confirmed its original determination for the Project is still valid.

The Chesapeake logperch is a fish species that occurs primarily in larger waterways and lowermost sections of tributaries (PAFBC, 2015). It is currently limited to the Susquehanna River and tributaries, and a few direct tributaries to the Chesapeake Bay. The preferred stream habitat for this species includes runs and riffles with rubble and boulders. In a letter dated November 21, 2016, PAFBC requested additional information from Transco regarding waterbody crossing methods and potential impacts on the Chesapeake logperch. Transco provided proposed waterbody crossing methods and timing windows for each stream crossed by the Project to the PAFBC in an e-mail dated February 20, 2017. In correspondence dated March 7 and September 27, 2017, the PAFBC concluded that the Project would not have significant adverse impacts on the Chesapeake logperch based on Transco's proposed crossing methods and timing windows, provided that best management practices and an approved erosion/sedimentation control plan are maintained.

TABLE 4.6.4-1

State-Listed Species Potentially Occurring in the Northeast Supply Enhancement Project Area

Common Name	Scientific Name	State Status [a]	Project Area Where Species May Occur
Mammals			
Humpback whale	*Megaptera novaeangliae*	E – NY E – NJ	Raritan Bay Loop
Birds			
Bald eagle	*Haliaeetus leucocephalus*	E – NJ [b] T – NY	Madison Loop Compressor Station 206 Quarryville Loop
Osprey	*Pandion haliaetus*	T – NJ [b]	Madison Loop
Grasshopper sparrow	*Ammodramus savannarum*	T – NJ	Compressor Station 206
Black-crowned night-heron	*Nycticorax nycticorax*	T – NJ [b]	Madison Loop
Yellow-crowned night-heron	*Nyctanassa violacea*	T – NJ	Madison Loop
Black skimmer	*Rynchops niger*	E – NJ	Raritan Bay Loop
Black tern	*Chlidonias niger*	E – NJ E - NY	Raritan Bay Loop
Common tern	*Sterna hirundo*	T – NY	Raritan Bay Loop
Least tern	*Sternula antillarum*	E – NJ T – NY	Raritan Bay Loop
Pied-billed grebe	*Podilymbus podiceps*	E – NJ [b]	Madison Loop
American bittern	*Botaurus lentiginosus*	E – NJ [b]	Madison Loop
Eastern black rail [d]	*Laterallus jamaicensis*	E – NJ [b]	Madison Loop
Upland sandpiper	*Bartramia longicauda*	E – NJ	Madison Loop
Short-eared owl	*Asio flammeus*	E – NJ [b]	Madison Loop
Peregrine falcon	*Falco peregrinus*	E – NJ [b]	Madison Loop
Red-headed woodpecker	*Melanerpes erythrocephalus*	T – NJ	Madison Loop
Loggerhead shrike	*Lanius ludovicianus*	E – NJ [c]	Madison Loop
Sedge wren	*Cistothorus platensis*	E – NJ	Madison Loop
Golden-winged warbler	*Vermivora chrysoptera*	E – NJ [b]	Madison Loop
Henslow's sparrow	*Ammodramus henslowii*	E – NJ	Madison Loop
Plants			
American holly	*Ilex opaca*	T – PA	Quarryville Loop
Torrey's rush	*Juncus torreyi*	E – NJ	Madison Loop
Amphibians			
Pine Barrens treefrog	*Hyla andersonii*	T – NJ	Madison Loop
Fish			
Chesapeake logperch	*Percina bimaculata*	T – PA	Quarryville Loop

[a] E = Endangered, T = Threatened.
[b] Breeding population only.
[c] Non-breeding population only.
[d] On October 9, 2018, the FWS proposed the eastern black rail for listing as threatened under the ESA; therefore, this species is further addressed in section 4.6.3.2.

Sources: PAGC, PAFBC, PADCNR, NJDEP, NJNHP, NYSDEC, NYNHP.

4.6.4.2 New Jersey

Transco's consultations with the NJNHP and NJDEP identified 22 threatened, endangered, special concern, and rare species under NJDEP jurisdiction that may occur near the Project facilities in New Jersey. These species included 19 birds, 1 mammal, 1 amphibian, and 1 plant. Of these, the bald eagle is also federally protected under the BGEPA, and is discussed above in section 4.5.1.2. A summary of surveys and/or proposed mitigation for the remaining species is discussed below.

The NJNHP identified 15 bird species as potentially occurring along the Madison Loop. As discussed in section 4.5.1.2, Transco has agreed to adopt vegetation clearing windows during construction to minimize impacts on nesting migratory birds. In addition, NJNHP identified four seabird species as potentially occurring along the offshore portion of the Raritan Bay Loop. Impacts on state-listed seabird species would be similar to those described for the federally listed seabirds in section 4.6.3.2. Based on information provided by the NJDEP, Transco conducted an inventory of potential osprey nests in the Project area. Per the NJDEP, no work is permitted within an osprey nest buffer (300 meters) between April 1 and August 31. Transco identified one potential osprey nest within 300 meters of the Madison Loop and one potential nest within 300 meters of the offshore portion of the Raritan Bay Loop. A third potential nest, also associated with the offshore portion of the Raritan Bay Loop, was determined to be inactive during the 2017 nesting season. Transco would monitor all potential nests to determine if the nests are active in future breeding seasons and would work with the NJDEP to determine the appropriate measures to avoid disturbing active nests during construction.

Torrey's rush is a perennial member of the rush family, grows from rhizomes within associated tiny tubers, and flowers and fruits from early summer to fall (Thompson and Paris, 2004). Torrey's rush is found on wet sandy shores, edges of sloughs, along slightly alkaline watercourses, swamps, sometimes on clay soils, calcareous wet meadows, and alkaline soils (Flora, 2017). It can be found in many habitats across the southern half of Canada, and coast to coast in the United States (USDA, 2017c). During rare flora surveys conducted in August 2016, Transco documented the presence of Torrey's rush in one wetland (W-T07-001D-1) crossed by the Madison Loop. Transco proposes to install exclusion fencing around the wetland to minimize impacts on the Torrey's rush individuals. Transco continues to consult with the NJDEP regarding the proposed mitigation.

The Pine Barrens treefrog is a mid-sized treefrog, with adults ranging from 1.13 to 1.75 inches in length (Conant and Collins, 1991). Temporary woodland ponds, white cedar or cranberry bogs, and seepage areas along tributaries of major rivers and streams serve as breeding ponds for the Pine Barrens treefrog. Occasionally, disturbed areas – such as borrow pits, roadside ditches, vehicle ruts, or pools found along power line corridors – may be used as breeding sites, provided that appropriate shrubby and herbaceous vegetation is available. Treefrogs prefer ponds that support sphagnum moss, sedges, grasses, or aquatic plants and are surrounded by dense, woody vegetation. Breeding ponds, which may dry up by mid-summer, contain shallow water, with depths often less than 23.6 inches (60 centimeters) and in some cases less than 3.9 inches (10 centimeters)) (Freda and Morin, 1984). The water is clean, yet acidic, with pH values ranging from 3.38 to 5.9 (Zappalorti and Johnson, 1981). The preference for acidic water serves to reduce competition with other frog species that cannot tolerate this low pH. In 1979, the Pine Barrens treefrog was listed as an endangered species in New Jersey due to its restricted range and declining population, habitat loss, and the pollution of breeding ponds (State of New Jersey, 2017). This species has a disjunct range with other populations occurring in North Carolina, South Carolina, Florida, Georgia, and Alabama. In New Jersey, the Pine Barrens treefrog occurs throughout the Pine Barrens in Burlington, Ocean and Atlantic counties. Smaller populations have been recorded from Monmouth, Camden, Gloucester, Cumberland, and Cape May Counties and they are believed to have been extirpated from Middlesex County (NJDEP, 2013a). NJDEP identified the Pine Barrens treefrog as potentially occurring near Compressor Station 206. Transco conducted wetland delineations within the Compressor Station 206 site boundary between October and

December 2016 and determined that the wetlands consist of large open slope systems with groundwater hydrologic connectivity and multiple perennial surface waterways crossing them; therefore, the topography and hydrologic drainage patterns identified within the wetlands lack the seasonally ponded depressional hydrogeomorphic conditions indicative of vernal pools. Based on the lack of suitable habitat, we conclude that the Project would not impact the Pine Barrens treefrog.

The humpback whale is a New Jersey state-listed endangered species (NJDEP, 2017c) and is a global species that can be found in all major oceans of the world. In the western North Atlantic, humpback whales can be found throughout the eastern coast of the United States throughout the year (NMFS, 2017o). In 2016, the previously globally listed humpback whale was divided into 14 DPSs, 4 of which are federally listed as endangered, and 1 of which is federally listed as threatened (81 Federal Register 62259). The DPS that inhabits the waters of the Northeast U.S. (i.e., the West Indies DPS) was found to not warrant federal listing at this time. Threats to humpback whales include entanglement in fishing gear, collisions with vessels, harassment by whale watching boats, degradation to habitats, and harvest outside of the United States (NMFS, 2017o). During the spring, summer, and fall, the humpback whales from the West Indies DPS feed in the North Atlantic Ocean in a geographic range encompassing the eastern coast of the U.S. (especially the Gulf of Maine), the Gulf of St. Lawrence, Newfoundland/Labrador, western Greenland, Iceland, and northern Norway (NMFS, 2017o; Waring et al., 2016). During the winter, humpback whales from most North Atlantic feeding areas migrate south to the West Indies to mate and calve (Waring et al., 2016). In the New York Bight, important humpback whale prey items include sandlance, herring, and Atlantic mackerel (FWS, 1997). Humpback whales are frequently found in relatively shallow waters, and are regularly found in the New York Bight, including along western Long Island, the New York Harbor, and the surrounding shore (FWS, 1997, NYSDEC, 2017b). Sightings in the area have increased in recent years (Associated Press, 2014), and the species is likely to be present in the Project area during construction. The potential effects of the Project on humpback whales would be limited primarily to noise associated with the installation and removal of temporary piles. Based on Transco's acoustic analysis, no humpback whales are expected to be taken by Level A harassment during pile installation and removal. However, Transco expects that their final IHA request will include a small number of Level B harassment takes of humpback whale. The risk of adverse effects of Project-related noise would be reduced by Transco's various mitigation measures, including the implementation of its Marine Mammal Observer Training and Response Protocol Plan and the use of NMFS-approved observers to monitor for marine mammals. Additionally, we recommend that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with predicted values and/or to reduce the noise to acceptable levels (see section 4.5.2.8). Transco's proposed use of marine mammal observers and reduced speed of construction vessels would also substantially reduce the chance of humpback whales being struck by Project-related vessels.

4.6.4.3 New York

Transco's consultations with the NYSDEC and New York Natural Heritage Program identified 5 threatened, endangered, special concern, and rare species that may occur near the offshore Project facilities in New York. Of these, one is also a federally protected species (bald eagle), which is discussed above in section 4.5.1.2.

The black tern is a New York state-listed endangered species (NYSDEC, 2017b). The black tern is a semi-colonial waterbird that nests on inland marsh complexes, ponds, mouths of rivers and shores of large lakes. In North America, the breeding range extends from central British Columbia, east across the prairie provinces to central Ontario and southern Quebec, south to central California, Utah, Wyoming, Kansas, Iowa, Illinois, Indiana, Ohio, northern New York, and northern New England. The black tern winters in marine and coastal areas of Central America and northern South America. In New York, black tern breeding colonies once occurred at 56 sites along the southern and eastern shores of Lake Ontario from Niagara Falls to Watertown, in marshes along the St. Lawrence River and inland marshes of western, central and northwestern New York. Today, approximately 200 nesting pairs occur at less than 20 of the historic breeding sites (NYSDEC, 2017b).

The common tern is a New York state-listed threatened species (NYSDEC, 2017b). Common terns inhabit sand and shell beaches, grassy uplands and rocky inland shores in North and South America, Eurasia, and northern Africa. In New York, common terns nest predominantly on Long Island, but they are also known to breed on small natural and artificial islands (power cribs, piers, navigation sites, etc.) in Lake Erie, Lake Ontario, the St. Lawrence and Niagara Rivers, and Oneida Lake in central New York (NYSDEC, 2017b). From late April to mid-May, common terns return to their northern breeding colonies. These colonies may contain several hundred to several thousand birds, including roseate, least and gull-billed terns, and black skimmers on Long Island.

The least tern is a New York state-listed threatened species (NYSDEC, 2017b). The least tern breeds on broad, level expanses of open sandy or gravelly beach, dredge spoil, and other open shoreline areas, and more rarely, inland on broad river valley sandbars. The least tern has a nearly worldwide distribution. In the Western Hemisphere, it breeds on the Pacific Coast from central California to Peru, inland along the Colorado, Red, Rio Grande, Missouri and Mississippi River Systems, on the Atlantic Coast from Maine to Argentina, and along the Great Lakes in Michigan, Minnesota, Wisconsin, and Ohio. Migrants mainly occur on Long Island's outer coast and rarely on the lower Hudson River. This species winters from the Gulf Coast and Central America south to Peru and Brazil (NYSDEC, 2017b).

Although nesting habitat would not be impacted by construction of the Project in New York, Raritan Bay is an important feeding area for common and least terns due to their nearby breeding grounds on Long Island (New Jersey Audubon, 2017b). In addition, black terns visit Raritan Bay annually as they migrate to their breeding grounds in northern New York. Impacts on state-listed terns would be similar to those discussed in section 4.6.3.2 above for the roseate tern. Construction of the Raritan Bay Loop could impact foraging or migrating terns due to construction related noise and lighting, and increased sedimentation which could result in decreased feeding efficiency. Based on the short-term nature of the construction, the amount of available habitat in the area, and the existing level of vessel traffic, lighting, and noise in Raritan Bay, we conclude that the Project would not significantly affect the black, common, or least tern.

The humpback whale is a New York state-listed endangered species (NYSDEC, 2017b), and is discussed in section 4.6.4.2 above.

4.6.4.4 General Impacts and Mitigation

In general, impacts on state-listed species would typically be similar to those described for other plant and animal species discussed in sections 4.5.2.8 and 4.6.3. Given that some surveys for state-listed species are not yet complete, Transco continues to consult with state agencies to develop and implement appropriate avoidance and mitigation measures including timing restrictions, as necessary, to avoid adverse impacts on any rare plants and wildlife identified within the NESE Project area.

4.7 LAND USE, RECREATION, SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

4.7.1 Existing Land Use

Land use in the NESE Project area consists primarily of agricultural, forest, open, commercial/industrial, residential, transportation, wetland, and marine/open water uses. The onshore portion of the Project would require about 241.9 acres for construction in Pennsylvania and 117.1 acres in New Jersey. After construction is completed in Pennsylvania, Transco would maintain 24.6 acres as permanent easement, 4.2 acres for aboveground facilities, and 0.6 acre for access roads. The remaining 212.4 acres would be restored and allowed to revert to preconstruction uses, except for about 1.5 acres of forest land within the permanent right-of-way, which would be converted to open land. In New Jersey, Transco would retain and maintain about 3.7 acres as permanent easement, 23.4 acres for aboveground facilities, and 0.1 acre for access roads during operation of the Project facilities. An additional 3.0 acres would be retained as permanent easement over segments of the Madison Loop installed by HDD, but Transco would not maintain these easements. The remaining 86.9 acres would be restored and allowed to revert to preconstruction uses, except for about 1.0 acre of forest land within the permanent right-of-way, which would be converted to open land, and 13.5 acres of forest land that would be permanently converted to commercial/industrial land for operation of Compressor Station 206 and the permanent access road to the facility.

Construction of the offshore portion of the Project would require about 3,726.2 acres in New Jersey waters and 10,439.0 acres in New York waters. This 14,165.2-acre area encompasses the area needed for spread anchoring of marine vessels. Of this area, only 87.8 acres of seafloor would be directly affected by construction. Following construction, Transco would retain about 22.4 acres as permanent easement in offshore areas of New Jersey and 63.2 acres as permanent easement in offshore areas of New York. Transco would not maintain the operational easement in the offshore environment; therefore, all offshore areas affected by the Project would be allowed to revert to previous uses.

Land use impacts associated with the onshore proposed loops and ancillary and aboveground facilities would include the disturbance of existing land uses during construction and retention of an expanded permanent right-of-way during operation of the facilities. The land retained as permanent right-of-way would generally be allowed to revert to former use; however, certain activities such as the construction of aboveground structures would be prohibited. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be cleared of woody vegetation and maintained in an herbaceous/scrub-shrub vegetated state. This maintained right-of-way would be mowed no more than once every 3 years. Additionally, to facilitate route patrols and emergency access, a 10-foot-wide strip centered over the pipeline would be mowed annually, or more frequently as necessary. In wetland areas, trees within 15 feet of the pipeline centerline may be selectively removed.

The offshore portion of the Raritan Bay Loop would be located within Raritan Bay and Lower New York Bay, from the shoreline of Middlesex County, New Jersey to a location about 3 miles seaward of Rockaway, New York. The offshore pipeline would be installed using HDD and trenching methods described in section 2.3.3. Land use impacts associated with the offshore portion of the Raritan Bay Loop would include the disturbance of existing offshore uses during construction and retention of a permanent right-of-way during operation of the facilities. Transco would not maintain the permanent right-of-way in offshore areas; therefore, no additional disturbance to the seafloor is anticipated during operation of the pipeline loop. However, future development and installation of structures or additional facilities above the active pipeline would not be allowed within the permanent right-of-way. Transco would retain a 30-foot-wide permanent right-of-way for the offshore portion of the Raritan Bay Loop.

Table 4.7.1-1 summarizes land use impacts associated with the NESE Project, and impacts on individual resources and the measures that would be implemented to avoid or minimize land use impacts are discussed in detail below.

4.7.1.1 Pipeline and Additional Temporary Workspace

Table 2.2.1-1 provides the widths of temporary rights-of-way that Transco would use during construction of the onshore pipeline loops and the distance of the offset of each loop from existing Transco pipelines. The proposed loops would typically be offset from existing Transco pipelines by 25 feet; the Quarryville Loop would be collocated with existing Transco right-of-way for 9.9 of 10.2 miles, or 97 percent of its total length, and the Madison Loop would be collocated with existing Transco right-of-way for the entire 3.4 miles of its length. During construction, Transco would use up to 100 feet of existing, cleared right-of-way along the Quarryville Loop, and up to 90 feet of existing, cleared right-of-way along the Madison Loop, thus reducing new construction-related impacts that would typically occur on a greenfield right-of-way. Construction of the onshore portion of the proposed Raritan Bay Loop would be completed using the HDD method and collocated with the existing Transco LNYBL Loop C right-of-way until it crosses into Raritan Bay. The temporary construction workspace required for installation of the Raritan Bay Loop along the HDD path would be 20 feet wide.

Where collocated, the permanent right-of-way of the proposed Quarryville and Madison Loops would typically be 50 feet wide, consisting of 25 feet of existing right-of-way already retained for operation of Transco's adjacent pipelines and 25 feet of new right-of-way for the loop. Where not collocated with an existing Transco right-of-way, the permanent right-of-way for the Quarryville and Madison Loops would be 50 feet wide. For the onshore portion of the Raritan Bay Loop, Transco would retain the entire 20 feet of temporary construction workspace as permanent right-of-way during operation of the pipeline loop.

For construction of the offshore segment, Transco would use a 125-foot-wide temporary construction workspace where the pipeline loop crosses into Raritan Bay between MPs 12.2 and 12.3. The temporary construction workspace would then be expanded to 2,500 feet until the pipeline loop crosses into deeper water within Raritan Bay near MP 12.0, at which point Transco would expand the temporary construction workspace to 5,000 feet for the remainder of the pipeline loop. In addition, Transco would use a separate temporary construction right-of-way of 45 feet for installation of the CP line near the shoreline. The proposed 5,000 feet of temporary construction workspace is necessary to accommodate the anchor spread of barges and support vessels used during all phases of offshore construction, and to support security and escort boat travel during construction to monitor and alert non-Project vessels approaching the construction area.

TABLE 4.7.1-1

Land Affected by Construction and Operation of the Northeast Supply Enhancement Project (acres)

	Agricultural		Forest Land		Commercial/ Industrial		Transportation Land		Residential [a]		Open Land		Wetlands		Marine/Open Water		Total	
State/Facility	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op
ONSHORE																		
Pennsylvania																		
Quarryville Loop																		
Pipeline [b]	96.9	19.3	5.1	1.5	1.4	0.3	2.1	0.4	3.6	<0.1	10.1	1.8	2.5	0.5	0.3	0.1	121.8	23.9
CP Systems	0.9	0.2	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	1.0	0.2
New and Modified Mainline Valves [c]	0.3	0.3	0.1	0.1	0.8	0.1	--	--	--	--	0.3	0.1	--	--	--	--	1.4	0.5
ATWS	59.0	--	0.9	--	0.8	--	1.1	--	0.8	--	2.4	--	--	--	--	--	65.0	--
Access Roads	0.6	0.1	0.1	0.1	0.2	0.2	1.7	0.3	<0.1	--	--	--	--	--	--	--	2.6	0.6
Contractor Yards	20.9	--	0.2	--	<0.1	--	<0.1	--	--	--	<0.1	--	--	--	--	--	21.2	--
Pipeline Subtotal	178.6	19.9	6.2	1.7	3.1	0.5	5.0	0.6	4.4	<0.1	12.8	1.9	2.5	0.5	0.3	0.1	213.0	25.2
Aboveground Facilities																		
Compressor Station 200	--	--	<0.1	--	22.3	0.3	0.6	0.2	--	--	6.0	3.8	--	--	--	--	28.9	4.2
Aboveground Facilities Subtotal	--	--	<0.1	--	22.3	0.3	0.6	0.2	--	--	6.0	3.8	--	--	--	--	28.9	4.2
Pennsylvania Onshore Subtotal	178.6	19.9	6.3	1.7	25.4	0.8	5.7	0.8	4.4	<0.1	18.8	5.7	2.5	0.5	0.3	0.1	241.9	29.5
New Jersey																		
Madison Loop																		
Pipeline [d]	--	--	6.2	1.0	3.3	--	2.5	--	1.0	--	17.1	1.9	5.1	0.4	0.4	--	35.7	3.2
CP Systems (none)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New and Modified Mainline Valves [c]	--	--	--	--	0.2	<0.1	<0.1	<0.1	0.1	0.1	0.3	0.3	--	--	--	--	0.6	0.5
ATWS	--	--	4.5	--	0.1	--	0.2	--	1.0	--	7.1	--	1.0	--	0.1	--	14.0	--
Access Roads	--	--	<0.1	--	0.8	--	8.0	<0.1	0.6	0.1	0.8	--	<0.1	--	<0.1	--	10.3	0.1
Contractor Yards	--	--	1.4	--	13.1	--	0.1	--	--	--	0.6	--	--	--	--	--	15.2	--
Madison Loop Subtotal	--	--	12.1	1.0	17.5	--	10.9	<0.1	2.7	0.2	25.9	2.1	6.1	0.4	0.5	--	75.7	3.7

TABLE 4.7.1-1 (cont'd)

Land Affected by Construction and Operation of the Northeast Supply Enhancement Project (acres)

	Agricultural		Forest Land		Commercial/ Industrial		Transportation Land		Residential [a]		Open Land		Wetlands		Marine/Open Water		Total	
State/Facility	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op
Raritan Bay Loop (Onshore)																		
Pipeline [e]	--	--	--	--	0.2	--	0.2	--	--	--	0.8	--	--	--	--	--	1.2	
CP Systems	--	--	--	--	0.0	--	0.1	--	--	--	0.2	--	--	--	--	--	0.2	--
ATWS	--	--	--	--	0.5	--	0.1	--	--	--	0.6	--	--	--	--	--	1.1	
Access Roads	--	--	--	--	0.1	--	0.0	--	--	--	0.4	--	--	--	--	--	0.4	--
Contractor Yards [f]	--	--	--	--	11.3	--	0.0	--	--	--	0.0	--	--	--	--	--	11.3	--
Raritan Bay Loop (Onshore) Subtotal	--	--	--	--	12.0	--	0.3	--	--	--	1.9	--	--	--	--	--	14.3	
Aboveground Facilities																		
Compressor Station 206 [g]	--	--	13.4	10.3	--	--	--	--	--	--	5.4	4.9	1.0	0.9	--	--	19.8	16.1
Compressor Station 206 Access Road	0.7	0.7	3.2	3.2	--	--	<0.1	<0.1	--	--	0.5	0.5	2.8	2.8	--	--	7.3	7.3
Aboveground Facilities Subtotal	0.7	0.7	16.6	13.5	--	--	--	--	--	--	5.9	5.4	3.9	3.7	--	--	27.1	23.4
New Jersey Onshore Subtotal	0.7	0.7	28.7	14.5	29.5	--	11.2	0.1	2.7	0.2	33.7	7.5	10.0	4.1	0.5	--	117.1	27.1
Onshore Total	179.3	20.7	35.0	16.1	54.9	0.8	16.9	0.8	7.2	0.2	52.5	13.2	12.5	4.6	0.8	0.1	359.1	56.5
OFFSHORE																		
New Jersey																		
Raritan Bay Loop (Offshore)																		
Pipeline (HDD) [h]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,376.4	22.4	3,376.4	22.4
ATWS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	349.8	0.0	349.8	0.0
New Jersey Offshore Subtotal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,726.2	22.4	3,726.2	22.4
New York																		
Raritan Bay Loop (Offshore)																		
Pipeline (HDD) [h]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10,439.0	63.2	10,439.0	63.2
ATWS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New York Offshore Subtotal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10,439.0	63.2	10,439.0	63.2

TABLE 4.7.1-1 (cont'd)

Land Affected by Construction and Operation of the Northeast Supply Enhancement Project (acres)

	Agricultural		Forest Land		Commercial/ Industrial		Transportation Land		Residential [a]		Open Land		Wetlands		Marine/Open Water		Total	
State/Facility	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op
Project Offshore Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14,165.2	85.6	14,165.2	85.6
Project Total	179.3	20.7	35.0	16.1	54.9	0.8	16.9	0.8	7.2	0.2	52.5	13.2	12.5	4.6	14,166.0	85.7	14,524.3	142.1

[a] Residential lands may also overlap with other land use categories such as forested, open, and wetland. Although the impacts identified are based on land use type, we discuss residential impacts for all residences in section 2.4.4 regardless of land use category.

[b] For the Quarryville Loop, Transco would use a 100-foot-wide construction right-of-way in upland areas, including up to 100 feet of existing permanent right-of-way, and a 75-foot-wide construction right-of-way in wetlands. Includes estimated impacts between MP 1686.0 and MP 1686.7 of the Quarryville Loop. Final impacts for this segment will be included in the final EIS but are not expected to vary significantly from the information provided.

[c] Installation of new and modified mainline valves and modification of existing mainline valves would occur within the temporary construction workspace for the pipeline loops; therefore, no additional temporary impacts on land uses are provided for construction of the valves. Following the completion of construction, operation of the new and modified valves would result in the permanent conversion of existing land uses to commercial/industrial land use category; operational impacts presented reflect this conversion.

[d] For the Madison Loop, Transco would use a 90-foot-wide construction right-of-way in upland areas, including up to 90 feet of existing permanent right-of-way, and a 75-foot-wide construction right-of-way in wetlands.

[e] For the onshore portion of the Raritan Bay Loop, temporary construction impacts would be minimal because the pipeline would be installed using the HDD method and activity would be limited to foot traffic to lay guide wires for the HDD. The permanent right-of-way for operation of the onshore portion of the Raritan Bay Loop would be 20 feet wide.

[f] The contractor yards that would be used for the Raritan Bay Loop are existing industrial shipping yard (the Construction and Marine Equipment yard and the Weeks Marine Facility); therefore, use of these facilities would be consistent with their current use.

[g] Interconnect facilities associated with Compressor Station 206 are included in total impacts.

[h] For the offshore portion of the Raritan Bay Loop, Transco would use a 5,000-foot-wide temporary construction right-of-way and up to 200 feet of permanent right-of-way for operation of the pipeline.

Note: The totals shown in this table may not equal the sum of addends due to rounding.

Con = construction; Op = operation

ATWS = Additional temporary workspace

HDD = Horizontal directional drill

Aerial photograph-based alignment sheets depicting the construction and permanent right-of-way configurations for the onshore and offshore portions of the proposed loops can be viewed on the FERC website (see section 2.1). Table 4.7.1-1 summarizes the acres of each land use type that would be affected by construction and operation of the onshore and offshore portions of the Project. A discussion of impacts on land use types and the measures that Transco would implement to mitigate impacts is presented below.

In addition to the construction right-of-way previously noted, Transco identified areas where site-specific conditions require the use of ATWS outside of the proposed nominal construction rights-of-way for the onshore and offshore pipeline facilities. ATWS generally would be required in areas where the proposed pipeline route crosses wetlands and waterbodies, steep side slopes, agricultural land, roads, railroads, and existing utilities; at HDD entry and exit points; and to accommodate stringing of the HDD pullback section. A list of ATWS associated with the onshore and offshore portions of the Project is included in appendix D. Except as otherwise requested by Transco due to site-specific constraints, ATWS would be set back 50 feet from the edges of wetlands and waterbodies. The ATWS that would be located closer than 50 feet to a wetland or waterbody are listed in table 2.3-2. A total of 429.9 acres of ATWS would be used temporarily during construction of the Project.

Agricultural Land

Agricultural land includes land associated with active croplands, hayfields, and pasture. Impacts on agricultural land would be limited to the Quarryville Loop; no agricultural land would be crossed in New Jersey by the Madison Loop or the onshore portion of the Raritan Bay Loop. Agricultural lands that would be impacted by the Project are primarily used for raising crops. Corn and soybeans are the most common commodities grown in farmed areas (USDA, 2012). Table 4.7.1-1 presents the acres of agricultural land that would be affected by construction of the Quarryville Loop.

Construction on annually cultivated agricultural land would be conducted as described in section 2.3.1. The effects of construction on agricultural land would be expected to be minor and short-term. Short-term impacts on agricultural areas would include the loss of standing or row crops within the construction work area and the disruption of farming operations for the growing season during the year of construction. To reduce these impacts, Transco would adhere to the measures outlined in its Plan and Procedures. In addition, Transco has developed an Agricultural Construction and Monitoring Plan that outlines specific procedures Transco would implement to avoid or mitigate impacts on agricultural lands during construction and operation of the Project. These measures would include testing the topsoil and subsoil for compaction at regular intervals in areas disturbed by construction activities; plowing severely compacted soil; strictly controlling equipment traffic on agricultural land to minimize compaction and rutting; and implementing its Noxious Weed and Invasive Plant Management Plan to avoid the spread of noxious and invasive species in agricultural lands. To preserve soil fertility in agricultural land, the entire topsoil layer (to a maximum depth of 12 inches) would be stripped from the full construction right-of-way in agricultural lands and stored separately from the subsoil for replacement after backfilling the trench. Following construction, Transco would implement the restoration practices outlined in its Agricultural Construction and Monitoring Plan. Agricultural lands would be restored within the permanent right-of-way and uses would continue as before construction. Transco would monitor crops of agricultural areas during the first and second growing seasons after seeding to determine if additional restoration is needed.

As part of its Agricultural Construction and Monitoring Plan, Transco has also established a toll-free number that can be used by landowners for 3 years following construction to report any agricultural issues observed by a landowner on their property. Transco would inspect and remedy as soon as possible any restoration issues reported by the owner/tenant. Transco would schedule an appointment with the owner/tenant to make the field inspection and then assign individual(s) from its response team to develop a solution to the issue. Restoration plans and treatment schedules would be formalized in writing.

Table 4.7.1-2 presents the location of agricultural drain tiles identified along the Quarryville Loop. Transco would be responsible for repairing or replacing any drain tiles or irrigation systems damaged by Project construction. Transco would employ specialists to verify that any repairs made have been successful.

TABLE 4.7.1-2

Agricultural Drain Tiles Crossed by the Quarryville Loop

County	Begin Milepost	End Milepost	Tract Number
Lancaster County	1688.1	1688.2	PA-LA-80
	1689.8	1689.9	PA-LA-93
	1690.8	1690.8	PA-LA-100
	1690.9	1690.9	PA-LA-102
	1691.1	1691.1	PA-LA-104

No specialty crop areas, active pasture lands, or certified organic farms were identified along the Quarryville Loop. However, Transco identified five farms that are currently implementing organic farming practices in pursuit of organic certification (see table 4.7.1-3). Three of the five tracts (PA-LA-36, PA-LA-44, and PA-LA-45) are currently certified as an official organic farm through the Pennsylvania Certified Organic (PCO) organization and the USDA. The other two tracts are uncertified organic farms.

TABLE 4.7.1-3

Certified and Uncertified Organic Farmland Crossed by the Quarryville Loop

County	Tract Number	Status	Crossing Length (miles)
Lancaster County	PA-LA-35	Uncertified	0.3
	PA-LA-36	Certified Organic	0.2
	PA-LA-44	Certified Organic	< 0.1
	PA-LA-45	Certified Organic	0.2
	PA-LA-102	Uncertified	0.3
		Project Total	0.7

The PCO organization is a USDA-accredited body responsible for certifying organic farms in Pennsylvania and surrounding regions (PCO, 2017). As a condition of certification, farm owners/operators agree to periodic inspections and testing by PCO to verify compliance with 7 CFR Part 205, National Organic Program. Prior to soil disturbance for energy infrastructure development projects, PCO requires farmers with certified organic farmland to consult with PCO to identify steps to be taken to minimize risks to their certification and to restore certification for any areas where certification is removed as a result of the project. Following the completion of construction, PCO may inspect the area to verify the presence or absence of a variety of chemicals and substances that, if present, could result in removal or suspension of certification. Landowners would be compensated for the use of their land through the easement negotiation process.

Transco's Agricultural Construction and Monitoring Plan specifies vegetation maintenance activities designed specifically to meet the operational needs of and protect organic farming practices in these areas. Furthermore, Transco would work cooperatively with any landowners who request organic restoration methods, including the two farms identified that are implementing organic farming techniques and may be seeking organic certification. Construction of the Quarryville Loop could result in accidental spills of fuels, lubricants, or other substances that, if not properly remediated, could impact the farms' chances of obtaining organic certification from the certifying organization. Transco would implement its Spill Plan during construction to reduce the potential for accidental spills. The Spill Plan specifies cleanup procedures to be used in the event of soil contamination from spills or leaks of oil and hazardous materials.

Transco would monitor excavations during construction for evidence of pre-existing potential contamination. If encountered, Transco would follow its Unanticipated Discovery of Contamination Plan.

No-till farming practices are intended to improve soil quality, thereby improving productivity and profitability for future farming (PA No-till Alliance, 2017). As listed in table 4.7.1-4, the Quarryville Loop would cross farms that are currently practicing no-till farming and farms that rotate between till and no-till farming in their cultivated fields.

TABLE 4.7.1-4

Till and No-till Farmland Crossed by the Quarryville Loop

Farm Type/County	Tract	Begin Milepost	End Milepost	Crossing Length (miles)	Land Affected During Construction (acres)	Land Affected During Operation (acres) [a]
No-till Farms						
Lancaster County	PA-LA-6	1681.43	1681.70	0.3	4.4	0.8
	PA-LA-10	1681.70	1681.73	< 0.1	0.3	0.1
	PA-LA-9	1681.73	1681.94	0.2	3.2	0.6
	PA-LA-13	1681.95	1682.53	0.6	9.1	1.7
	PA-LA-22	1682.66	1683.13	0.5	8.1	1.4
	PA-LA-24	1683.13	1683.33	0.2	5.6	1.0
	PA-LA-29	1683.55	1684.15	0.6	10.1	1.8
	PA-LA-30	1684.15	1684.34	0.2	4.1	0.7
	PA-LA-32	1684.34	1684.58	0.3	3.9	0.4
	PA-LA-31	1684.63	1684.76	0.1	5.0	0.8
	PA-LA-34	1684.91	1685.03	0.1	1.9	0.4
	PA-LA-35	1685.03	1685.27	0.2	4.2	0.6
	PA-LA-46	1685.78	1686.00	0.2	3.5	0.7
	PA-LA-80	1687.90	1688.18	0.3	4.3	0.5
	PA-LA-81	1688.18	1688.57	0.4	5.7	0.6
	PA-LA-98	1690.38	1690.59	0.2	3.3	0.2
Farms that Rotate Between Till and No-till Farming						
Lancaster County	PA-LA-36	1685.28	1685.47	0.2	3.8	0.4
	PA-LA-44	1685.76	1685.78	< 0.1	0.7	0.1
	PA-LA-45	1685.58	1685.76	0.2	3.9	0.5
	PA-LA-79	1686.72	1687.89	1.2	22.9	3.3
	PA-LA-84	1689.03	1689.38	0.4	5.7	0.7
	PA-LA-100	1690.59	1690.86	0.3	4.3	0.0
	PA-LA-102	1690.86	1691.13	0.3	3.6	0.1
			Project Total	6.9	121.5	17.4

[a] Transco would not maintain the operational right-of-way through active agricultural areas.

NOTE: The sum of addends may not total due to rounding.

Construction of the Quarryville Loop would impact about 121.5 acres of no-till farmland. The Quarryville Loop would be collocated with Transco's existing Mainline right-of-way for 97 percent of its length; therefore, the construction workspace on no-till farmlands would overlap with the existing right-of-way and the pipeline loop would be adjacent to operational right-of-way that is already located within no-till farmlands. Following construction, Transco would restore the temporary construction workspace and agricultural activities would be allowed to continue as before. For these reasons, impacts on no-till farmland would be temporary and minor and would resolve with the completion of construction in these areas.

As listed in table 4.7.1-5, the Quarryville Loop would cross areas currently enrolled in agricultural conservation easements or programs.

TABLE 4.7.1-5

Agricultural Conservation Easements Crossed by the Quarryville Loop

County	Milepost Range	Easement Type or Program	Distance Crossed (miles)	Land Affected by Construction (acres)	Land Affected by Operation (acres)
Lancaster County	1681.9 – 1681.9	Pennsylvania Department of Agriculture (PADOA) and Lancaster County Agricultural Preservation Board (LCAPB).	< 0.1	0.1	0.0
	1682.5 – 1682.5	PADOA and LCAPB	< 0.1	0.5	0.0
	1682.7 – 1683.1	PADOA and LCAPB	0.5	8.1	1.4
	1683.1 – 1683.4	PADOA and LCAPB	0.2	6.0	1.2
	1683.6 – 1684.2	LCAPB	0.6	10.1	1.8
	1685.0 – 1685.3	LCAPB	0.2	4.3	0.6
	1685.8 – 1686.0	PADOA and LCAPB	0.2	6.3	0.7
	1687.9 – 1688.2	Conservation Reserve Easement Program and LCAPB	0.3	4.3	0.5
	1689.0 – 1689.4	LCAPB	0.4	5.7	0.7
	1689.8 – 1689.9	LCAPB	0.1	0.5	0.1
		Quarryville Loop Total	2.6	45.9	7.0

The Quarryville Loop would cross one Conservation Reserve Enhancement Program property between approximate MPs 1687.9 and 1688.2. This property is also designated as an Agricultural Security Area (ASA); details regarding administration of ASAs in Pennsylvania is presented below. The Conservation Reserve Enhancement Program is a voluntary federal/state partnership with the goals of improving water quality, reducing soil erosion, improving wildlife habitat, and increasing farm income on marginal farmland (PAGC, 2017a). Landowners enrolled in this program are not prohibited from participating in oil and gas leases, provided the land is restored to a farmable condition following construction; a landowner must repay Conservation Reserve Enhancement Program money on any land that is not restored (Northeast Natural Resources Advisory Board, Inc., No Date (N.D.)).

In Pennsylvania, local municipalities designate lands as ASAs based on landowner request, in accordance with Pennsylvania Code 1967 P.L. 992, No. 442 and 32 P. S. Subsection 5001–5012. ASA lands are defined as a unit of land consisting of 250 or more acres that is reserved for agricultural production of crops, livestock, or livestock products. The ASA program is designed to promote and support permanent and viable farming operations. Owners of ASA lands may apply for the purchase of an agricultural conservation easement to receive preferential zoning treatment from the county or municipality, which allows landowners to prevent development or improvement of a parcel for any purpose outside of agricultural production (Pennsylvania Farmland Preservation Association, 2012). For a parcel to qualify for an agricultural conservation easement, it must first be designated as an ASA. Agricultural conservation easements may be sold or donated by a landowner to the state, county, local government, or local land trust and are administered by local boards and staff in each county in Pennsylvania. Agricultural conservation easements crossed by the Quarryville Loop are held by or administered by the Lancaster County Agricultural Preservation Board, the Pennsylvania Department of Agriculture, Lancaster County, and the Lancaster Farmland Trust.

Development of these properties is not restricted by their designation as ASAs and landowners may choose to develop the land in any manner authorized by local ordinances and regulations. Furthermore, the existence of utility facilities on a property does not prevent the land from being designated as an ASA or agricultural conservation easement. Agricultural conservation easements function like a deed restriction and restricts the uses and improvements of the land to those that are compatible with the stated conservation purposes of the conservation easement, but does not preclude all development of the land. Agricultural conservation easements may specifically allow one or more residences, farm buildings, driveways, aboveground and belowground utilities, and other structures, even though these activities and improvements will convert some of the land to non-agricultural use and reduce some of the agricultural production potential of the property. For the properties that would be crossed by the Quarryville Loop, oil and gas development is allowed by the local zoning ordinances and regulations in these areas; therefore, the construction and operation the pipeline loop would not impact the ASA or agricultural conservation easement designation of properties that are crossed. Transco would restore agricultural properties within ASAs or agricultural conservation easements in accordance with its Agricultural Construction and Monitoring Plan.

Because the land would be restored to farmable conditions, it is not anticipated that the Project would affect the landowner's enrollment in the Conservation Reserve Enhancement Program. However, if the property owner is penalized or disqualified from the program because of Project construction or operation, Transco has committed to compensate the affected landowner for the financial impact resulting from disqualification or penalty.

The Pennsylvania Department of Agriculture oversees and administers the Clean and Green Program, established under the Pennsylvania Farmland and Forest Land Assessment Act, also referred to as Act 319. The program was developed to preserve and protect farmland and forested areas throughout the state. The Clean and Green Program provides a tax benefit to owners of agricultural or forest land by basing property taxes on the use value of the land as compared to its market value. Individual owners who agree to devote their lands to agricultural use, agricultural reserve, or forest reserve are given preferential assessment. Table 4.7.1-6 lists the Clean and Green properties crossed by the Quarryville Loop.

Transco has limited the proposed construction right-of-way width to 100 feet in uplands and 75 feet in wetlands along the Quarryville Loop, and would implement the construction methods described in its Plan and Procedures for these properties. Following construction, Transco would typically retain 25 feet of new permanent right-of-way where collocated with the existing Transco right-of-way, and 50 feet of new permanent right-of-way where not collocated. Agricultural uses would continue normally after construction and forest land would be permanently removed from the new operational right-of-way. Based on recent amendments to Act 319 (Act 88 of 2010), landowners participating in the Clean and Green Program are protected from roll-back taxes due to the development of a gas well or pipeline on their property. Under Act 88, land subject to preferential assessment may be used for exploration for, and removal of, gas and oil, which includes the development of appurtenant facilities, including new roads and bridges, pipelines, and other buildings or structures related to those activities (Conservation Tools.org, N.D.). Because of these amendments, construction and operation of the Project would not disqualify landowners currently enrolled in the Clean and Green Program from receiving tax benefits, and parcels enrolled in the Clean and Green Program are expected to maintain their eligibility. Therefore, it is not anticipated that the Project would affect a property's status within the Clean and Green Program.

Forest Land

Forest land includes upland forest or woodland, except forested wetlands. The Quarryville and Madison Loops would cross forest land in Pennsylvania and New Jersey. Table 4.7.1-1 presents the acres of forest land that would be affected by construction and operation of the pipeline loops. The onshore portion of the Raritan Bay Loop would not cross forest land. The types of forested vegetation affected by the Project are discussed in more detail in section 4.4.1.3.

TABLE 4.7.1-6 **Pennsylvania Clean and Green Program Lands Crossed by the Quarryville Loop**			
County/Tract Number	Begin Milepost	End Milepost	Crossing Distance (miles)
Lancaster County			
PA-LA-2	1681.0	1681.4	0.4
PA-LA-6	1681.4	1681.7	0.3
PA-LA-9	1681.7	1681.9	0.2
PA-LA-10	1681.7	1681.7	0.1
PA-LA-12	1682.5	1682.5	0.0
PA-LA-13	1681.9	1682.5	0.6
PA-LA-14	1681.9	1681.7	< 0.1
PA-LA-22	1682.7	1683.1	0.5
PA-LA-24	1682.9	1683.4	0.4
PA-LA-27	1683.4	1683.5	0.2
PA-LA-29	1683.6	1684.2	0.7
PA-LA-30	1684.1	1684.4	0.3
PA-LA-31	1684.6	1684.9	0.3
PA-LA-32	1684.4	1684.6	0.3
PA-LA-34	1684.9	1685.0	0.1
PA-LA-35	1685.0	1685.3	0.3
PA-LA-36	1685.2	1685.5	0.2
PA-LA-44	1685.6	1685.8	0.2
PA-LA-46	1685.8	1686.0	0.2
PA-LA-48	1686.0	1686.1	0.1
PA-LA-79	1686.7	1687.9	1.2
PA-LA-80	1687.9	1688.2	0.3
PA-LA-81	1688.2	1688.6	0.4
PA-LA-82	1688.2	1688.6	0.4
PA-LA-83	1688.6	1689.0	0.5
PA-LA-84	1689.0	1689.4	0.4
PA-LA-88	1689.4	1689.8	0.4
PA-LA-93	1689.8	1689.9	0.1
PA-LA-95	1689.9	1689.9	< 0.1
PA-LA-98	1690.4	1690.6	0.2
PA-LA-100	1690.6	1690.9	0.3
PA-LA-101	1691.1	1691.2	0.1
PA-LA-104	1691.1	1691.2	0.1
		Quarryville Loop Total	**9.8**

Construction of the pipeline loops in forested areas would require the removal of trees to prepare the construction work areas. However, Transco would minimize forest land impacts by locating the proposed facilities within or adjacent to existing rights-of-way, minimizing the construction workspace, and utilizing open or agricultural land for contractor/pipe yards and staging areas to the extent possible. Following construction, disturbed areas would be restored to current conditions to the extent possible in accordance with Transco's Plan and Procedures and any specific requirements identified by landowners or agencies with regulatory jurisdiction over or interest in private forest land. Although trees cleared within temporary construction work areas would be allowed to regenerate to preconstruction conditions following construction, impacts on forest resources within these areas would be long term.

Following construction, about 2.6 acres of forest land would be permanently converted to open land within the maintained permanent right-of-way. Transco would maintain a 10-foot-wide area centered over the pipeline loop in an herbaceous state to allow for safe operation of the pipeline loop. In addition, the clearing of Transco's permanent easement every 3 years would prevent forest overstory vegetation from attaining a mature size and, thus, would permanently alter the nature of the affected forest land within the permanent right-of-way.

Commercial/Industrial Land

Commercial/industrial land includes utility stations, paved areas, roads, commercial or retail facilities, and manufacturing or industrial plants. The proposed Quarryville and Madison Loops and the onshore portion of the Raritan Bay Loop would cross commercial/industrial land in Pennsylvania and New Jersey. Table 4.7.1-1 presents the acres of commercial/industrial land that would be affected by construction and operation of the pipeline loops. Commercial/industrial lands affected by the Project primarily consist of previously disturbed land. One commercial/industrial structure has been identified within 50 feet of the Project (see section 4.7.3).

Commercial/industrial land uses could be temporarily impacted during pipeline construction by increased dust from exposed soils, construction noise, and traffic congestion. Transco would minimize impacts on commercial/industrial land uses by coordinating private driveway crossings with business owners to maintain vehicle access. Steel plates and/or wood mats would be kept on site at all times to create a temporary platform for access, if needed. Road surfaces would be restored as soon as practicable so that normal access can resume, and commercial/industrial land uses would be restored to preconstruction conditions, or as specified in landowner agreements. Commercial/industrial land uses would be allowed to return within the permanent right-of-way and uses would continue as before construction.

Transportation Land

Transportation land includes interstate highways; state, county, and local highways and roads; and railroad lines. The proposed loops would cross 18 roadways in Pennsylvania, 11 roadways in New Jersey, and 1 commuter railroad in New Jersey; no roadways would be crossed in New York. The roadways range from maintained local paved roads to state highways. Table 4.7.1-7 lists the roads and railroads that would be crossed by the proposed pipeline loops and table 4.7.1-1 presents the acres of transportation land that would be affected by construction and operation of the pipeline loops.

Roadways would be crossed using conventional bore, open-cut, or HDD crossing methods, which are described in sections 2.3.2.1 and 2.3.2.3. Use of HDD and bore crossing methods would allow the roadway to remain in service while the pipeline is installed, resulting in little or no disruption to traffic. In areas where the pipeline loops would be installed using open-cut crossing methods, impacts on roadways would include short-term traffic congestion and disruption. To minimize these impacts, Transco would consult with local law enforcement and safety officials to develop a Traffic and Transportation Management Plan. Because traffic may be diverted via temporary roads and driveways, traffic control would be implemented via warning signs and/or flagmen. Following construction, roadways would be restored to preconstruction conditions.

TABLE 4.7.1-7

Roads and Railroads Crossed by the Northeast Supply Enhancement Project

State/Facility/County/Township	Milepost	Road Name	Public or Private	Crossing Method
PENNSYLVANIA				
Quarryville Loop				
Lancaster County				
Drumore Township	1681.4	Furniss Road	Public	Open-cut
	1681.9	Silver Springs Road	Public	Open-cut
	1682.6	Liberty Court	Public	Open-cut
	1682.7	Susquehannock Drive (State Highway 3009)	Public	Bore
	1682.8	River Road	Public	Open-cut
	1684.8	Oregon Hollow Road	Public	Bore
	1685.3	Silver Springs Road	Public	Bore
	1685.5	Lancaster Pike (State Highway 272)	Public	Bore
East Drumore Township	1686.2	North Tanglewood Drive	Public	Open-cut
	1686.4	Oliver Drive	Public	Open-cut
	1686.5	Hopkins Mill Road	Public	Open-cut
	1686.7	Scotland Road	Public	Bore
	1687.9	Church Road	Public	Open-cut
	1688.6	Conowingo Road	Public	Bore
	1689.4	Robert Fulton Highway (State Highway 222)	Public	Bore
	1689.9	Dry Wells Road	Public	Open-cut
Eden Township	1690.4	Kirkwood Pike Road (State Highway 472)	Public	Bore
	1691.2	Hess Road	Public	Open-cut
NEW JERSEY				
Madison Loop				
Middlesex County				
Old Bridge Township	9.0	Cheesequake Road	Public	HDD
	9.5	U.S. Highway 9	Public	HDD
	9.8	Westminster Boulevard	Private	HDD
Borough of Sayreville	11.0	Fernandez Court (planned road)	Private	Open-cut
	11.1	Woodlake Drive (planned road)	Private	Open-cut
	11.2	Garden State Parkway North	Public	Bore
	11.4	Gondek Drive	Public	Bore
	12.0	Old Spye Road	Public	Bore
Raritan Bay Loop (Onshore)				
Middlesex County				
Sayreville Township	12.1	State Highway 35	Public	HDD
	12.1	Morgan Avenue	Public	HDD
	12.1	Cliff Avenue [a]	Public	HDD
	12.1 [a]	New Jersey Transit [b]	Public	HDD

[a] Features that would be crossed by both the onshore portion of the Raritan Bay Loop and the onshore portion of the Raritan Bay Loop CP system.

[b] Railroad crossing.

HDD = Horizontal directional drill

Residential Land

Residential land includes residential areas and the yards of residential properties. Residential lands may also overlap with other land use categories such as forested, open, and wetland. Although the impacts identified are based on land use type, we discuss residential impacts for all residences in section 4.7.3 regardless of land use category. The Quarryville and Madison Loops would cross residential land in Pennsylvania and New Jersey. The Raritan Bay Loop would not cross residential land in New Jersey or New York. The acres of residential land that would be affected by construction and operation of the pipeline loops is presented in table 4.7.1-1. A detailed description of the impacts of construction and operation of the Project may have on residential land and the mitigation measures that would be implemented to address impacts is presented in section 4.7.3. Construction methods proposed for residential areas are described in section 2.3.2.4.

Open Land

Open land includes non-forested, shrub/scrub, and undeveloped land not classified for another use, including land maintained as utility rights-of-way (e.g., existing overhead and underground electric transmission, natural gas transmission, and oil transmission facilities). The Quarryville and Madison Loops and the onshore portion of the Raritan Bay Loop would cross open land in Pennsylvania and New Jersey. Table 4.7.1-1 presents the acres of open land that would be affected by construction and operation of the pipeline loops.

The majority of the open land that would be impacted by the loops is associated with either Transco's existing rights-of-way or other utility rights-of-way currently maintained as open land. Construction-related impacts on open land would include the removal of vegetation and disturbance of the soils. These impacts would be temporary and short term and would be minimized by implementation of Transco's Plan and Procedures. Following construction, most open land uses would be able to continue and would likely return to preconstruction conditions in 1 to 5 years.

Wetlands

Wetlands include field-delineated wetlands, including forested wetlands. The Quarryville and Madison Loops would cross wetlands in Pennsylvania and New Jersey. The Raritan Bay Loop would not cross wetland areas. Table 4.7.1-1 presents the acres of wetland areas that would be affected by construction and operation of the pipeline loops. Additional details regarding wetland areas crossed by the proposed pipeline loops in Pennsylvania and New Jersey are presented in section 4.3.3.

Temporary impacts related to construction would be minimized by reducing the nominal temporary construction right-of-way to 75 feet in wetland areas along the proposed loops and implementing the special wetland construction techniques described in sections 2.3.2.2 and 4.3.3 and in Transco's Procedures. During operation of the pipeline facilities, most wetlands would continue to function as before construction, although trees would not be allowed to grow within 15 feet of the pipeline loop centerlines. Wetland impacts associated with the Project, as well as Transco's proposed mitigation measures, are discussed further in section 4.3.3.

Marine/Open Water

Marine/open water includes rivers, streams, creeks, canals, and other flowing waterbodies, as well as oceans, lakes, ponds, and other non-flowing waterbodies. The Quarryville and Madison Loops would cross marine/open water in Pennsylvania and New Jersey. The onshore portion of the proposed Raritan Bay Loop would not cross marine/open water; however, the entire offshore portion of the Raritan Bay Loop would be located in marine/open water in New Jersey and New York. Table 4.7.1-1 presents the acres of marine/open water that would be affected by construction and operation of the onshore and offshore portions of the pipeline loops.

As discussed in section 4.3.2, construction of the proposed pipeline facilities across or near onshore open water areas (i.e., waterbodies) could result in short-term and minor impacts on waterbodies. These impacts could result from initial equipment crossings; temporary bridge installation; construction adjacent to stream channels; clearing and grading of adjacent lands and streambanks; trench dewatering; unanticipated releases of drilling mud or chemical contaminants that could result in temporary modification of aquatic habitats through direct impacts; increased erosion, sedimentation and/or turbidity; decreased dissolved oxygen concentrations; and introduction of chemical contaminants such as fuel and lubricants.

To minimize impacts on waterbodies, Transco would use the HDD and bore crossing methods to install the Quarryville and Madison Loops across open water areas in Pennsylvania and New Jersey. Use of the HDD and bore crossing methods during construction would avoid direct impacts on open water areas and would minimize indirect impacts because drill entry and exit workspaces would be set back from streambanks. In addition, Transco would implement its Plan and Procedures to minimize the potential for erosion and sedimentation in waterbodies during construction and its Spill Plan to minimize the risk of introducing of chemical contaminants into waterbodies during construction. With implementation of these measures, impacts on waterbodies would be avoided to the extent practicable. No impacts on onshore open water areas would occur due to operation of the pipeline loops.

The offshore portion of the Raritan Bay Loop would be installed in marine/open water. Transco would install the pipeline loop and associated CP system using the HDD and trench methods described in section 2.3.3. These construction methods were developed in consultation with the USACE to avoid creation of navigational hazards and ensure adequate burial depth of the pipeline loop. These methods would minimize disturbance of the seafloor to the extent practicable during construction. Following construction, Transco would retain 30 feet of permanent right-of-way along the pipeline loop in New Jersey waters and 200 feet of permanent right-of-way in New York waters; the remainder of the temporary construction workspace would be allowed to revert to previous uses. For these reasons, impacts on offshore marine/open water areas would be minimized to the extent practicable.

4.7.1.2 Ancillary Facilities

Ancillary pipeline facilities including MLVs, pig launcher/receivers, CP systems, and miscellaneous tie-in facilities are detailed in table 2.1.1-2. Construction of the ancillary facilities would affect about 3.0 acres of land, of which about 1.2 acres would be permanently converted to industrial uses for operation of the facilities. Land use impacts associated with these facilities are listed in table 4.7.1-1.

One new MLV would be installed and modifications to two existing MLVs would occur along the proposed Quarryville Loop. A portion of the footprint for the new and modified MLVs (about 1.0 acre total) would be located within the existing permanent right-of-way for Transco's Mainline. The remaining 0.5 acre required for construction and operation of the new and modified MLVs along the Quarryville Loop would be located in greenfield areas. One new MLV would be installed and modifications to one existing MLV would occur along the proposed Madison Loop (about 0.5 acre total); both MLVs would be installed within the existing permanent right-of-way for Transco's LNYBL Loop C. Operation of facilities at new locations and new land required to accommodate MLV modifications would result in a permanent land use conversion to commercial/industrial. Visual impacts associated with the operation of these facilities are discussed separately in section 4.7.9.

One CP system would be installed perpendicular to the Quarryville Loop near MP 1684.2 in Pennsylvania, and would temporarily impact 1.0 acre of land during construction and 0.2 acre would be retained for operation. In New Jersey, no new CP systems would be installed for the Madison Loop. Installation of the onshore portion of the Raritan Bay Loop CP system would temporarily impact about 0.2 acre land where HDD tracking wires would be installed. The offshore portion of the CP system for the Raritan Bay Loop would be installed using HDD and dredging methods, and the facilities would be buried beneath the seafloor during operation.

4.7.1.3 Compressor Stations

About 28.9 acres of land would be required for modifications to existing Compressor Station 200 in Chester County, Pennsylvania. Construction at the existing compressor station would occur within the previously disturbed, graded, or graveled areas of the existing fenceline of the facility. Of the 28.9 acres of land required for the proposed modifications, Transco would retain about 4.2 acres for operation of the new facilities, which would result in a permanent conversion of existing land uses to commercial/industrial. Land uses that would be affected by the modifications are listed in table 4.7.1-1.

Proposed Compressor Station 206 would be in Franklin Township, Somerset County, New Jersey. About 19.8 acres of land would be required for construction of the station. Transco would retain about 16.1 acres for operation of the facility, which would result in a permanent conversion of existing land uses. Transco would construct a new permanent access road to the compressor station from County Road 518, which would result in an additional 7.3 acres of construction and permanent impact on existing land uses. Land use impacts associated with Compressor Station 206 and the permanent access road to the facility are listed in table 4.7.1-1.

4.7.1.4 Contractor Yards

Land uses that would be affected by temporary use of contractor/pipe yards to support construction of the Project are listed in table 4.7.1-1. Transco proposes to use contractor/pipe yards at three locations on a temporary basis to support construction activities for the Quarryville Loop in Pennsylvania (see table 2.2.4-1). These yards would temporarily affect about 21.2 acres of land. For construction of the Project facilities in New Jersey, Transco proposes to use four locations on a temporary basis to support construction activities along the Madison Loop (see table 2.2.4-1). These yards would temporarily affect about 15.3 acres of land. Transco proposes to use an existing marine docking facility (about 5.5 acres) and an existing marine contractor yard (about 5.8 acres) on a temporary basis to support construction of the offshore portion of the Raritan Bay Loop (see table 2.2.4-1).

Upon completion of construction, the yards would be restored in accordance with Transco’s Plan, unless otherwise requested by the landowner or land-managing agency, and prior use of the sites would continue.

4.7.1.5 Access Roads

Transco would use a combination of existing public roads, the construction right-of-way, and newly constructed access roads for primary access to the pipeline loops and aboveground facilities during construction. Transco proposes to use 11 access roads during construction of the Quarryville Loop in Pennsylvania, of which 7 are existing roads and 4 would be newly constructed. The majority of the existing roads that would be used for construction of the Quarryville Loop have an aggregate, dirt, or vegetative surface and would require modifications such as surface modification, widening, and tree clearing based on the equipment that would use the road. Modifications to access roads would affect about 2.0 acres of existing roads and construction of new access roads would affect about 0.6 acre. Following the completion of construction, Transco would retain four permanent access roads, of which two are existing roads and two would be newly constructed. About 0.6 acre of land would be retained by Transco for use as a permanent access road during operation of the pipeline loop.

During construction of the Madison Loop in New Jersey, Transco proposes to use 13 access roads, of which 9 are existing roads and the remaining four would be newly constructed access roads. In total, about 9.8 acres of land would be affected by use and modification of the existing access roads. Following the completion of construction, 8 of these roads would be restored and allowed to revert to previous uses, while one existing road would be retained as a permanent access road for operation of the pipeline loop. Construction of the four new access roads would affect about 0.4 acres of land and about 0.1 acre of land would be retained by Transco for use as a permanent access road during operation of the pipeline loop.

For the onshore portion of the Raritan Bay Loop, Transco would primarily use public roads to access work areas. However, Transco would temporarily use one existing access road during construction of the pipeline loop, impacting about 0.4 acre of land. In addition, about 7.3 acres of land would be affected by construction of a permanent access road to Compressor Station 206. Details regarding the proposed access roads and the total acres of impacts for each road are presented in table 4.7.1-8.

Following the completion of construction, all temporary access roads would be restored to preconstruction conditions unless otherwise requested by the landowner or land-managing agency.

4.7.2 Land Ownership and Easement Requirements

The Project would cross primarily private land, except for State of New Jersey and State of New York submerged lands crossed by the offshore portions of the Raritan Bay Loop and the special interest areas identified in table 4.7.5-1. No federally owned or tribally owned or reservation land would be crossed or affected by the Project.

Pipeline operators must obtain easements from landowners and land-managing agencies to construct and operate natural gas facilities, or acquire the land on which the facilities would be located. Easements can be temporary, granting the operator the use of the land during construction (e.g., for ATWS, access roads, yards); or permanent, granting the operator the right to operate and maintain the facilities after construction. Transco would need to acquire long-term easements and/or special use permits to construct and operate the new Project facilities. These authorizations would convey temporary and permanent rights-of-way to Transco for construction and operation of the proposed facilities. An easement agreement between a company and a private landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. The easement would give the company the right to construct, operate, and maintain the pipeline, and establish a permanent right-of-way. Landowners would be compensated for the use of their land through the easement negotiation process.

For this Project, Transco's existing permanent easements associated with its existing pipelines gives Transco the right to maintain the right-of-way as necessary for pipeline operation, including the periodic removal of larger vegetation and trees, as needed. In some areas, Transco has sited the Project facilities entirely within its existing permanent easement, in which case Transco may not need to acquire additional land or permanent easements. In other areas, Transco would need to acquire new easements or acquire the necessary land to construct and operate the Project. The easements would convey both temporary (for construction) and permanent rights-of-way to Transco and would give Transco the right to construct, operate, and maintain the pipeline and related facilities.

TABLE 4.7.1-8

Access Roads Associated with the Northeast Supply Enhancement Project

State/Facility/County/ Access Road ID	Milepost	Existing Road (Yes/No)	Existing Road Surface	Planned Road Width (feet)	Planned Road Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Use (Permanent or Temporary)
PENNSYLVANIA								
Quarryville Loop								
Lancaster County								
AR-LA-001	1681.0	Yes	Asphalt	20 - 55	550.0	0.4	0.4 [c]	Permanent [c]
AR-LA-002	1682.5	No	N/A	25	728.0	0.4	0.0	Temporary
AR-LA-003	1683.4	Yes	Gravel	15 - 20	2,524.0	0.9	0.0	Temporary
AR-LA-004	1684.2	Yes	Dirt	10	1,029.0	0.2	0.0	Temporary
AR-LA-005	1685.6	Yes	Gravel	10 - 25	528.0	0.2	0.0	Temporary
AR-LA-006	1689.7	Yes	Dirt	10	232.4	0.1	0.0	Temporary
AR-LA-007 [a]	1691.2	Yes	Gravel	40 - 55	68.7	0.1	0.1 [c]	Permanent
AR-LA-008	1686.1	Yes	Asphalt	15	417.4	0.1	0.0	Temporary
AR-LA-009	1687.9	No	N/A	20	142.4	0.1	0.1	Permanent
AR-LA-011	1691.2	No	N/A	40	70.8	0.1	0.1	Permanent
AR-LA-012	1693.7	No	N/A	25	51.0	0.1	0.0	
				Quarryville Loop Total	**6,341.7**	**2.6**	**0.6**	
NEW JERSEY [b]								
Madison Loop								
Middlesex County								
AR-MS-001	8.8	Yes	Asphalt/Dirt	25 - 35	2,161.0	1.6	0.0	Temporary
AR-MS-002	8.7	Yes	Dirt	25	250.0	0.1	0.0	Temporary
AR-MS-003	8.9	No	N/A	20	297.0	0.1	0.0	Temporary
AR-MS-004	9.9	Yes	Asphalt	42	2,254.0	1.8	0.0	Temporary
AR-MS-005	10.4	Yes	Gravel	25 - 35	3,443.0	2.2	0.0	Temporary
AR-MS-007	9.8	Yes	Asphalt	30 - 40	2,372.0	1.9	0.0	Temporary
AR-MS-009	11.9	No	N/A	12	198.0	0.1	0.1	Permanent
AR-MS-010 [c]	8.6	Yes	Asphalt	15 - 24	1,173.0	0.4	0.0	Permanent
AR-MS-011	11.1	Yes	Asphalt	15 – 30	1,1859.0	1.3	0.0	Temporary
AR-MS-012	9.4	Yes	Asphalt	28	484.0	0.3	0.0	Temporary
AR-MS-013	9.4	Yes	Asphalt	31	242.0	0.2	0.0	Temporary
AR-MS-014	N/A	Yes	Asphalt/Gravel	15	279.0	0.1	0.0	Temporary
AR-MS-015	N/A	Yes	Asphalt/Gravel	15	276.0	0.1	0.0	Temporary
				Madison Loop Total	**15,288.0**	**10.1**	**0.1**	

TABLE 4.7.1-8 (cont'd)

Access Roads Associated with the Northeast Supply Enhancement Project

State/Facility/County/ Access Road ID	Milepost	Existing Road (Yes/No)	Existing Road Surface	Planned Road Width (feet)	Planned Road Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Use (Permanent or Temporary)
Raritan Bay Loop								
Middlesex County								
AR-RBL-001	NA	Yes	Grass/Gravel	50	370.0	0.4	0.0	Temporary
				Raritan Bay Loop Total	**370.0**	**0.4**	**0.0**	
Compressor Station 206								
Somerset County								
AR-CS206	N/A	No	N/A	100	3,300.0	7.3	7.3	Permanent
				Compressor Station 206 Total	**3,300.0**	**7.3**	**7.3**	
				Project Total	**25,299.7**	**20.5**	**7.9**	

[a] Permanent access road for Transco's MLV that would be used as an access road for construction and operation of the Project facilities.
[b] No additional access roads are required for Compressor Station 200.
[c] This is an existing access road to Transco's MLV that would be used during construction and operation of the Project.
N/A = Not applicable

If an easement cannot be negotiated with a landowner and the Project has been certificated by the FERC, the company may use the right of eminent domain granted to it under section 7(h) of the NGA and the procedure set forth under the Federal Rules of Civil Procedure (Rule 71A) to obtain the right-of-way and extra workspace areas. The company would still be required to compensate the landowner for the right-of-way and for any damages incurred during construction. However, a court would determine the level of compensation if a Certificate is issued. In either case, the landowner would be compensated for the use of the land. While no federal lands are affected by the Project, it should be noted that eminent domain would not apply to lands under federal ownership.

4.7.3 Existing Residences and Commercial and Industrial Facilities

Transco's proposed construction work area would be located within 50 feet of 56 residences (houses, apartments, townhomes, etc.) and other buildings (see table 4.7.3-1). As discussed in section 2.3.2.1, Transco initially proposed to use the HDD method to install the Quarryville Loop between MPs 1686.1 and 1686.8, which would minimize impacts on the Tanglewood neighborhood, where approximately 15 residential properties abut either side of Transco's existing right-of-way (see table 4.7.3-1). However, based on the results of its final feasibility study for the proposed HDD and Direct Pipe method, Transco concluded that these methods would pose a high risk to nearby water wells and Conowingo Creek, and that the Direct Pipe method could also result in subsidence along the drill path and potentially damage pipeline coatings. We reviewed the HDD and Direct Pipe feasibility study and agree that these methods would pose an unacceptable risk to drinking water wells or result in other adverse effects. Due to these risks, Transco proposes to use standard overland trenching methods to install the Quarryville Loop between two of the three existing pipelines in its right-of-way through the Tanglewood neighborhood.

The structures within 50 feet of the construction work area would be most likely to experience the effects of construction and operation of the Project. In general, as the distance to the construction work area increases, the impacts on residences decrease. In residential areas, typically the greatest impacts are temporary disturbances during construction and the burden of the permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

Temporary construction impacts on residential areas could include inconvenience caused by noise and dust generated by construction equipment, personnel, and trenching of roads or driveways; traffic congestion; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and/or adjacent rights-of-way; potential damage to existing septic systems or wells and other utilities; and removal of aboveground structures such as fences, sheds, playgrounds, or trailers from within the right-of-way.

Before mobilizing any equipment, Transco would stake the limits of disturbance and the centerline of the pipeline. If construction would require the removal of private property features, such as gates or fences, Transco would notify the landowner prior to construction. Affected landowners would be notified at least 7 days before trench excavation commences, unless more advance notice is requested by the landowner during easement negotiations. Transco's planned work schedule would typically be 6 days per week (Monday through Saturday) from 7:00 a.m. to 7:00 p.m., with the exception of HDD operations.

TABLE 4.7.3-1

Residences and Other Structures Within 50 Feet of the Construction Work Area Associated with the Northeast Supply Enhancement Project

State/Facility/County	Approx. Milepost	Tract Number	Building Type	Distance From Proposed Pipeline (feet)	Distance from Structure to Edge of Construction Workspace (feet)	Direction from Proposed Pipeline
PENNSYLVANIA						
Quarryville Loop						
Lancaster	1682.6	PA-LA-15	Garage	89	24	Northwest
	1682.6	PA-LA-15	Residence	106	41	Northwest
	1682.6	PA-LA-16	Residence	57	22	Southeast
	1682.6	PA-LA-18	Residence	65	15	Northwest
	1682.6	PA-LA-21	Residence	40	5	Southeast
	1682.6	PA-LA-15.001	Garage	195	37	Northwest
	1682.7	PA-LA-15.001	Residence	162	43	Northwest
	1685.2	PA-LA-36.002	Residence	169	50	Northwest
	1685.5	PA-LA-39	Business	95	47	Northeast
	1685.5	PA-LA-39	Business	11	2	Northeast
	1685.5	PA-IA-39	Storage	93	37	Northwest
	1685.5	PA-LA-40	Business	137	48	Southwest
	1685.6	PA-LA-41	Business	154	34	Northeast
	1686.2	PA-LA-49	Barn[a]	124	0	Northwest
	1686.2	PA-LA-52	Shed[a]	98	11	Northwest
	1686.2	PA-LA-52	Pool[a]	100	31	Northwest
	1686.2	PA-LA-53	Residence	54	19	Southeast
	1686.3	PA-LA-55	Storage[a]	97	32	Southeast
	1686.3	PA-LA-56	Residence	69	34	Southeast
	1686.3	PA-LA-57	Residence	104	39	Northwest
	1686.3	PA-LA-57	Shed	73	8	Northwest
	1686.3	PA-LA-58	Residence	68	33	Southeast
	1686.3	PA-LA-58	Pool	59	24	Southeast
	1686.3	PA-LA-59	Residence	91	26	North
	1686.3	PA-LA-59	Garage	75	10	Northeast
	1686.3	PA-LA-61	Garage	33	7	Southeast
	1686.3	PA-LA-61	Residence	62	27	Southeast
	1686.4	PA-LA-63	Residence	78	43	South
	1686.4	PA-LA-62	Residence	104	39	Northwest
	1686.4	PA-LA-64	Residence	123	47	North
	1686.4	PA-LA-66	Residence	77	42	South
	1686.5	PA-LA-71	Residence	81	46	South
	1686.7	PA-LA-78	Storage[a]	72	36	South
	1688.8	PA-LA-83	Barn[a]	91	27	North
	1689.2	PA-LA-84	Barn[a]	50	15	North
	1689.4	PA-LA-85	Storage[a]	121	19	North
NEW JERSEY						
Madison Loop						
Middlesex	8.6	NJ-MI-1	Control Building[a]	115	18	North
	9.2	NJ-MI-9.002.CY	Commercial	1,830	5	South
	9.7	NJ-MI-12	Apartments	30	20	North
	9.7	NJ-MI-12	Apartments	~~34~~	24	North
	9.7	NJ-MI-12	Apartments	52	42	North

TABLE 4.7.3-1 (cont'd)

Residences and Other Structures Within 50 Feet of the Construction Work Area Associated with the Northeast Supply Enhancement Project

State/Facility/County	Approx. Milepost	Tract Number	Building Type	Distance From Proposed Pipeline (feet)	Distance from Structure to Edge of Construction Workspace (feet)	Direction from Proposed Pipeline
	9.6	NJ-MI-12	Apartments	96	41	South
	9.7	NJ-MI-12	Apartments	205	45	South
	9.7	NJ-MI-12	Apartments	175	46	South
	9.8	NJ-MI-12	Apartments	31	21	South
	9.8	NJ-MI-16	Apartments	116	28	North
	9.9	NJ-MI-16	Apartments	118	42	North
	10.4	NJ-MI-17	Building	62	46	South
	10.4	NJ-MI-18	Residence	83	27	North
	10.4	NJ-MI-18	Residence	95	26	North
	11.1	NJ-MI-29	Townhomes	95	35	West
	11.1	NJ-MI-30	Townhomes	99	39	West
	11.1	NJ-MI-30	Townhomes	98	38	West
	11.2	NJ-MI-30	Townhomes	87	27	West
	11.3	NJ-MI-32	Townhomes	108	16	West
	11.3	NJ-MI-32	Townhomes	104	28	West
	11.3	NJ-MI-32	Townhomes	97	28	West
	11.4	NJ-MI-32	Townhomes	90	24	West
	11.4	NJ-MI-32	Townhomes	102	27	West
	11.6	NJ-MI-35	Dock[a]	0	0	Southeast
	11.7	NJ-MI-35	Storage[a]	11	0	Southeast
	11.8	NJ-MI-35	Storage[a]	12	2	Southeast
	12.0	NJ-MI-37.001	Residence	142	42	South
	12.0	NJ-MI-39.003	Fire Station	50	7	South
	12.0	NJ-MI-39.005.CY	Commercial	9,270	19	Southeast
Raritan Bay Loop [b]						
Middlesex	12.5	NJ-MI-OL	Residence	137	40	South

[a] No site-specific Residential Construction Plan prepared.
[b] Existing buildings within 50 feet of the Raritan Bay Loop identified for onshore HDD workspace area only.

Transco would utilize special construction methods designed for working in residential areas. These special construction methods are described in section 2.3.2.4, and specific methods to be used on an individual property are shown on Transco's site-specific RCPs (see below). Transco would implement the following general measures to minimize construction-related impacts on all residences and other structures located within 50 feet of the construction right-of-way:

- attempt to maintain, where feasible, a minimum distance of 25 feet between any residence and the edge of the construction work area;
- install safety fence at the edge of the construction right-of-way for a distance of 100 feet on either side of the residence;
- delay excavation of the pipeline trench in residential areas until the pipe is ready for installation;

- attempt to preserve mature trees and leave landscaping intact within the construction work area, unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions;

- backfill the pipeline trench immediately upon completion of the pipeline installation;

- complete final cleanup, grading, and installation of permanent erosion-control measures within 10 days after backfilling the trench, weather permitting.

In residential and active commercial areas, Transco would complete the majority of construction within a 6-week period.

Transco has also developed site-specific RCPs to inform affected landowners of proposed measures to minimize disruption and to maintain access to the residences located within 50 feet of the construction work area for proposed facilities (see appendix G). These site-specific construction plans include a dimensioned drawing depicting the residence in relation to the pipeline construction; workspace boundaries; the proposed permanent right-of-way; and nearby residences, structures, roads, and miscellaneous features (e.g., other utilities, playgrounds, catch basin, sewer). We have reviewed the site-specific RCPs and find them acceptable.

Based on landowner contacts, Transco has not identified septic systems that would be affected by any temporary or permanent workspace areas. However, in the event a septic system is identified, Transco would consult with the landowner to avoid, relocate, reconfigure, or replace the existing septic system.

If the construction right-of-way crosses a road, Transco would maintain access and traffic flows, particularly for emergency vehicles and school buses. Transco would generally complete construction across driveways within 1 day through completion of a temporary surface. Final surfacing of driveways would occur separately in conjunction with other driveway final restorations within the area. If a road is open cut, a detour would be established and/or other traffic control measures to facilitate traffic flow during construction would be established. Transco would consult with local law enforcement and safety officials to identify traffic control measures or coordinate road closures and detours. Additional information regarding traffic impacts, including details regarding Transco's Traffic and Transportation Management Plan, is provided in section 4.8.7.2.

As discussed in section 4.10.1.5, air pollutants from construction equipment would generally be limited to the immediate vicinity of the construction area and would be temporary. Transco would implement the measures in its Fugitive Dust Control Plan to control dust from construction, including transporting soil or rock, trenching, and use of access roads.

As listed in table 4.7.3-1, one active business is located within 25 feet of construction at about MP 1685.5 along the Quarryville Loop. Transco reduced the offset of the proposed Quarryville Loop from the existing mainline from the typical 25 feet to 15 feet to reduce workspace and avoid a structure on the property. Based on Transco's correspondence with the business owner, the owner is concerned that construction activities would adversely impact business activities. While construction and operation of the Project would not directly affect the business, Transco continues to consult with the business owner to identify potential mitigation measures to satisfy the business owner.

Following construction, all residential areas would be restored to preconstruction conditions or as specified in written landowner agreements. Landowners would continue to have use of the right-of-way provided it does not interfere with the easement rights granted to Transco for construction and operation of the pipeline system. For example, no structures would be allowed on the permanent right-of-way, including houses, decks, playgrounds, tool sheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leaching fields, septic tanks, or any other objects not easily removed. As shown on its site-specific RCPs, Transco would avoid most of these features but, if necessary and with landowner permission, may need to remove and relocate the feature to an off-right-of-way location.

As listed in table 4.7.3-1, one residence at MP 1682.6 along the Quarryville Loop would be located within 10 feet of the proposed construction work area. Because of the increased potential for construction of the Project to disrupt this residence and to ensure that Transco has provided these specific property owners with adequate opportunity for input regarding construction activity so close to their residence, we recommended that Transco file landowner concurrence with the site-specific RCP at MP 1682.6 along the Quarryville Loop, or a plan to reduce the workspace in this location to provide at least 10 feet between the residence and the workspace, during the draft EIS comment period. In its May 11, 2018 supplemental filing, Transco provided a copy of the signed landowner agreement specific to affected tract PA-LA-21 at MP 1682.6 along the Quarryville Loop. We find this acceptable.

We believe that implementation of Transco's construction methods for working in proximity to residences and commercial facilities and site-specific RCPs would minimize disruption to residential and commercial areas to the extent practicable and facilitate restoration of these areas as soon as reasonably possible upon completion of construction.

In addition to providing RCPs for residences within 50 feet of the construction workspace, Transco has generally described how construction and operation of the NESE Project would impact affected homeowners. To further ensure that impacts on homeowners are minimized to the extent practicable, we have recommended in section 5.2 that Transco develop and implement an environmental complaint resolution procedure prior to construction.

4.7.4 Planned Developments

Transco contacted local officials in the affected counties and municipalities to identify planned residential, commercial, or industrial developments within 0.25 mile of the Project. As listed in table 4.7.4-1, no proposed projects are within 0.25 mile of the Quarryville Loop, four proposed projects are within 0.25 mile of the Madison Loop, and four proposed developments are within 0.25 mile of existing Compressor Station 200; no developments are known to be planned within 0.25 mile of the Raritan Bay Loop or Compressor Station 206. Section 4.12 discusses the cumulative impacts of the Project and other projects (e.g., transportation and energy projects) in the general Project area.

Based on a preliminary plan submitted to Chester County in 2014, the Swedesford Partners LP development would consist of about 15.7 acres of land adjacent to existing Compressor Station 200's southern property line to accommodate 3 warehouse/office buildings and a 159-space parking lot. However, based on Transco's consultations with the East Whiteland Township Planning and Development Department, the Swedesford Partners LP development has changed to a 66-unit townhome development, which is in the preliminary plan approval process (Greenly, 2016).

Based on a preliminary plan submitted to Chester County in 2016, the Great Valley Community Organization recreational facility would occupy about 7 acres of land southeast of Compressor Station 200 on North Bacton Hill Road and would include and outdoor playing fields.

TABLE 4.7.4-1

Proposed and Planned Residential and Commercial Projects Within 0.25 Mile of the Northeast Supply Enhancement Project

State/Facility/ County	Project Name	Approx. Distance and Direction from the Project	Description	Anticipated Construction Date/Project Status
PENNSYLVANIA				
Compressor Station 200				
Chester	Swedesford Partners LP	<0.1 mile south of Compressor Station 200 southern boundary	Potential residential development	Unknown
Chester	Great Valley Community Organization	0.2 mile southeast of Compressor Station 200 eastern boundary	Potential recreation development	Unknown
Chester	75 N. Bacton Hill Road	0.2 mile north of Compressor Station on Bacton Hill Road	Warehouse space	Unknown
Chester	North Bacton Hill Road Partners, LLC	0.25 mile south of Compressor Station 200 on Bacton Hill Road	Industrial space	Unknown
NEW JERSEY				
Madison Loop				
Middlesex	La Mer Phase 6-1	<0.1 mile west of the Madison Loop, MP 11.0	Multi-family residential development	Unknown
Middlesex	La Mer Phase 6-2	<0.1 mile east of the Madison Loop, MP 11.0	Multi-family residential development	Unknown
Middlesex	La Mer Phase 6-3	<0.1 mile southeast of the Madison Loop, MP 11.1	Multi-family residential development	Unknown
Middlesex	Windermere Townhomes in Sayreville	<0.1 mile southeast of the Madison Loop, MPs 11.3 to 11.4	Multi-family residential development	Unknown

Based on comments received from the County of Chester on the draft EIS, two additional developments are proposed within 0.25 mile of Compressor Station referred to as 75 N. Bacton Hill Road and North Bacton Hill Road Partners, LLC. The 75 N. Bacton Hill Road project would consist of about 9,200 square feet of warehouse space about 0.2 mile north of the compressor station site. The North Bacton Hill Road Partners, LLC project would consist of about 17,854 square feet of industrial space about 0.25 mile south of the compressor station site.

Between approximate MPs 11.0 and 11.2, the Madison Loop would cross a planned expansion of a residential complex referred to as La Mer. Based on a preliminary site plan, La Mer would be expanded in three phases, adding about 135 new residential units.

Between approximate MPs 11.2 and 11.4, the Madison Loop would be within 0.25 mile of a planned townhome development referred to as Windermere Townhomes. Based on a preliminary site plan, the development would consist of 74 townhomes.

Each development project listed in table 4.7.4-1 currently has an unknown construction schedule. Transco has been in contact with the developers of the subdivisions and, in most cases, Transco would construct the Project adjacent to its existing pipelines, which already precludes the placement of structures over the permanently maintained right-of-way at these locations. Transco would avoid direct impacts on the planned developments listed in table 4.7.4-1. The construction workspace associated with the Project would be located outside of the construction workspaces associated with the planned developments as currently proposed. However, indirect impacts such as noise from construction equipment and dust resulting from soil work would occur on a temporary basis. Transco would continue to coordinate with the developers and permitting authorities to identify any potential conflicts associated with the construction and operation of the Project.

Transco contends that the Project would not impact the proposed design of the La Mer development. The Madison Loop at the La Mer and Windermere Townhomes developments would be collocated with an existing Transco pipeline and be consistent with the existing land uses. At the La Mer development, Transco proposes to construct the new Madison Loop entirely within the existing Transco right-of-way in this area. At the Windermere Townhomes development, Transco proposes to adopt a cross-over to minimize impacts resulting from new additional permanent right-of-way in this area. Transco continues to correspond with the developers of the planned developments regarding construction.

Based on Transco's commitment to adopt the measures described above, as well as continuing to work with the developers, impacts on planned developments would be adequately minimized and minor.

We received comments expressing concern about future development of the Trap Rock Industries, Inc. quarry southwest of proposed Compressor Station 206. Mining operations are expected to continue until 2045, and the proposed reclamation plan indicates that the mine would be turned over to the state and potentially converted to a reservoir and public open space (Franklin Township Department of Planning and Zoning, 2012). Implementation of the reclamation plan would not occur for nearly 30 years and is thus speculative. However, we note that the compressor building would be about 0.4 mile from the nearest face of the mine and that mining is not expected to expand toward the compressor station site. The area between the mine and the compressor station is wooded, and the visual impact assessment indicates that the compressor station would be largely shielded from view from surrounding properties. Franklin Township specifically commented about the potential accumulation of 25 years of deposited air pollutants affecting future land uses at the quarry. None of the pollutants of concern are considered persistent environmental contaminants, all of them are subject to photooxidation (i.e., breaks down in sunlight) and/or biological degradation (i.e., breaks down by bacteria). Furthermore, in section 4.3.1 we conclude that hazardous liquids stored at the compressor station would not pose a significant risk to surface water or groundwater resources, and in section 4.10 we conclude that air emissions and noise from the station would not be significant. Therefore, we conclude that Compressor Station 206 would not pose a significant concern to potential reclamations plans for the Trap Rock quarry site.

We received comments that Compressor Station 206 would adversely affect future uses of Theresa's Farm. Theresa's Farm is concerned that noise from the compressor station could affect future plans to conduct therapeutic horse riding at the farm, and that air emissions from the compressor station would render crops as inorganic. Based on Somerset County tax records, Theresa's Farm occupies an 18-acre parcel that abuts the 52.3-acre parcel on which Compressor Station 206 would be located. Aerial imagery indicates that farm structures and cultivated fields occupy the eastern one-half of the property, whereas the portion of the property that abuts the compressor station parcel is heavily wooded. The compressor building, which would be the primary source of air emissions and noise, would be about 0.4 mile from the nearest cultivated field, and 0.5 mile from farm structures. The intervening area is heavily wooded. As discussed in section 4.10.2.2, an ambient noise survey was conducted at the New Jersey Buddhist Vihara and Mediation Center (NJBVMC) which is located near to Theresa's Farm and a similar distance from proposed Compressor Station 206. Noise modeling indicates that the increase in noise at the mediation center due to the compressor station would be 0.4 dBA, which is below the threshold of perception for the human ear. Also, as discussed in section 4.10.1, Compressor Station 206 would comply with applicable air quality standards that are protective of public welfare and, as noted in section 4.10.1.6, air emissions from the compressor station would not result in significant impacts on vegetation in the area. For these reasons we conclude that Compressor Station 206 would not significantly impact future uses of Theresa's Farm.

4.7.5 Recreation and Special Interest Areas

The Project would cross recreation and special land use areas in Pennsylvania, New Jersey, and New York, as discussed below. No federal lands would be crossed by or within 0.25 mile of the proposed Project facilities. Table 4.7.5-1 lists the state-, county-, locally, and privately owned or managed recreation and special land use areas that would be crossed by or within 0.25 mile of the Project facilities. A description of each area follows the table. Agricultural conservation easements crossed by the Quarryville Loop in Pennsylvania are presented in section 4.7.1.1; other non-agricultural state or county conservation easements are discussed in the subsections below. A discussion of the potential impacts and mitigation measures that would be implemented by Transco during construction and operation of the Project, based on consultations with landowners or land managing agencies, is presented for each recreation and special land use area below. In general, and as discussed in section 4.7.1, Transco would adhere to the measures outlined in its Plan and Procedures, which include restoring and reseeding to landowner or land managing agency specifications.

We received comments regarding the potential for the Project to impact recreation and special interest areas such as the Millstone Valley Scenic Byway, the Washington-Rochambeau Revolutionary Route, the Princeton Ridge Preserve, Delaware and Raritan Canal State Park, the Rockingham House, and other natural areas, religious facilities, schools, and daycares in the Project area. Potential Project impacts on the culturally significant aspects of these resources are discussed in section 4.9.1.1. Our review for potential Project impacts on recreation and special interest areas is focused on the area within 0.25 mile of the Project. Based on a review of publicly available data, many of the recreation and special interest areas noted in comments we received are located greater than 0.25 mile away from the Project area (the distance from the Compressor Station 206 site of the areas listed above range from 0.3 mile from the (Washington-Rochambeau Revolutionary Route) to approximately 1.7 miles (Princeton Ridge Preserve)) and, therefore, are beyond the scope of our review. Those areas that are located within 0.25 mile of the Project area are discussed below.

4.7.5.1 Onshore

One of the primary concerns when crossing recreation and special interest areas is the impact of construction on the purpose for which the area was established (e.g., the recreational activities, public access, and resources the area aims to protect). Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also generate dust and noise, which could be a nuisance to recreational users. Construction could also interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails.

In general, Project impacts on recreational and special interest areas occurring outside of forest land would be temporary and limited to the period of active construction, which typically would last only several days to several weeks in any one area. These impacts would be minimized by implementing Transco's Plan and Procedures. Following construction, most open land uses would be able to revert to their former uses. Forest land affected by the temporary construction right-of-way and ATWS areas, however, would experience long-term impacts because of the time required for the woody vegetation to reestablish to its preconstruction condition. Further, forest land within the permanent right-of-way would experience permanent impacts because it would be precluded from being reestablished within the maintained portion of the right-of-way.

TABLE 4.7.5-1

Federal, State, and Municipal Lands, Recreation Areas, and Special Interest Areas Crossed by or within 0.25 mile of the Northeast Supply Enhancement Project

State/Facility/County	Milepost Range	Name	Ownership/Management	Distance Crossed (miles)	Land Affected by Construction (acres) [a, c]	Land Affected by Operation (acres) [b, d]
ONSHORE						
Pennsylvania						
Quarryville Loop						
Lancaster County	1681.0 – 1681.0	Muddy Run Recreational Park	Muddy Run Recreational Park	<0.1	3.2	0.3
	1681.0 - 1681.4	Muddy Run State Game Lands 423	Pennsylvania Game Commission	0.4	14.7	1.7
	1681.9 – 1682.5	Silver Top Stables	Silver Top Stables	0.6	8.9	1.7
	1683.5 – 1683.6	Fishing Creek Nature Preserve North	Lancaster County Conservancy	0.1	1.0	0.2
	N/A	Wissler Run Nature Preserve	Lancaster County Conservancy	< 0.1 mile SE of contractor yard near MP 1681.0	N/A	N/A
	N/A	Fishing Creek North Trails	Lancaster County Conservancy	0.2 mile SE of MP 1683.5	N/A	N/A
	N/A	Camp Andrews	The Camp Andrews Association	0.1 mile NW of MP 1683.6	N/A	N/A
	1686.6 – 1686.7	Tanglewood Manor Golf Club	Tanglewood Manor Golf Club	0.1	0.1	0.0
	N/A	Enola Low Grade Trail	Eden Township	0.2 mile NW of MP 1691.2	N/A	N/A
	N/A	Enola Low Grade Trail	Bart Township	< 0.1 mile NW of AR-LA-012	N/A	N/A
Compressor Station 200						
Chester County	N/A	North Bacton Hill Road Field	Great Valley Association	0.2 mile SE of Compressor Station 200	N/A	N/A
New Jersey						
Madison Loop						
Middlesex County	N/A	Raritan Bay Cougars Football Field	Old Bridge (Raritan Bay) Cougar Pop Warner Association	0.2 mile N of contractor yard near MP 9.0	N/A	N/A
	N/A	Cheesequake State Park	New Jersey State Park Service	0.2 mile SE of MP 11.8	N/A	N/A
Raritan Bay Loop (Onshore)						
Union County	N/A	Veterans Memorial Waterfront Park	City of Elizabeth	0.2 mile NE of C&ME contractor yard	N/A	N/A
	29.7 – 30.6	Ambrose Channel	N/A	1.0	506.8	3.6
Compressor Station 206						
Somerset County	N/A	New Jersey Buddhist Vihara and Meditation Center	New Jersey Buddhist Vihara and Meditation Center	0.3 mile ESE of Compressor Station 206	N/A	N/A

TABLE 4.7.5-1 (cont'd)

Federal, State, and Municipal Lands, Recreation Areas, and Special Interest Areas Crossed by or within 0.25 mile of the Northeast Supply Enhancement Project

State/Facility/County	Milepost Range	Name	Ownership/Management	Distance Crossed (miles)	Land Affected by Construction (acres) [a, c]	Land Affected by Operation (acres) [b, d]
OFFSHORE						
New Jersey						
Raritan Bay Loop (Offshore)						
Middlesex County	12.2 – 14.0	New Jersey State-owned Submerged Land	State of New Jersey	1.9	976.2	7.5
	N/A	Raritan Bay Waterfront Park	Middlesex County	0.2 mile NW of MP 12.1	N/A	N/A
	N/A	Old Bridge Waterfront Park [e]	Old Bridge Township and Middlesex County	0.1 mile SW of MP 12.3	N/A	N/A
Monmouth County	14.1 – 14.7 and 26.6 – 30.6 [f]	New Jersey State-owned Submerged Land	State of New Jersey	0.6 and 4.1	2,750.2	14.9
	26.6 – 30.6 [f]	Commercial Whale Watching – General Use Area	N/A	4.1	2,716.1	14.9
	29.2 – 29.6	Between the Channels Grounds	N/A	0.4	39.9	0.0
	29.6 – 30.6	Ambrose Channel Grounds	N/A	1.0	507.1	3.6
New York						
Raritan Bay Loop (Offshore)						
Richmond County	14.0 – 24.9 [f]	New York State-owned Submerged Land	State of New York	10.9	6,603.8	39.8
	20.0 – 24.9	Commercial Whale Watching – General Use Area	N/A	4.9	3,011.5	18.1
Queens County	24.9 – 26.6 and 30.6 – 35.5	New York State-owned Submerged Land	State of New York	1.6 and 4.9	3,835.2	23.4
	24.9 – 26.6 and 30.6 – 32.8	Commercial Whale Watching – General Use Area	N/A	1.6 and 2.2	3,835.2	23.4
	30.4 – 30.8	Gong Grounds	N/A	0.3	11.8	0.0
	30.6 – 30.8	Ambrose Channel Grounds [g]	N/A	0.2	170.5	0.7
	31.1 – 31.7	Tin Can Grounds [g]	N/A	0.6	211.8	2.1
	32.8 – 35.5	Commercial Whale Watching – Dominant Use Area	N/A	2.7	1,719.0	9.8
	35.5 – 35.5	Scallop Ridge Grounds	N/A	< 0.1	45.3	0.0

TABLE 4.7.5-1 (cont'd)

Federal, State, and Municipal Lands, Recreation Areas, and Special Interest Areas Crossed by or within 0.25 mile of the Northeast Supply Enhancement Project

State/Facility/County	Milepost Range	Name	Ownership/Management	Distance Crossed (miles)	Land Affected by Construction (acres) [a, c]	Land Affected by Operation (acres) [b, d]

[a] Construction impacts for the onshore portions of the Quarryville Loop, Madison Loop, and Raritan Bay Loop include total footprint of temporary workspace and additional temporary workspace and are inclusive of the permanent right-of-way.

[b] Operational impacts for the onshore portions of the Quarryville Loop, Madison Loop, and Raritan Bay Loop include areas within the permanent right-of-way that would be maintained during operation of the Project facilities.

[c] Acreages presented for construction impacts associated with the offshore portion of the Raritan Bay Loop reflect the 5,000-foot-wide construction buffer. However, the Ambrose Channel would be crossed using HDD methods and no direct impacts are anticipated between the HDD entry and exit points at this crossing.

[d] Acreages presented for operational impacts associated with the offshore portion of the Raritan Bay Loop reflect the permanent easement that would be acquired by Transco. After installation of the pipeline, maintenance activities involving ground disturbance during operation of the pipeline would be minimal.

[e] This property is enrolled in the Green Acres Program.

[f] Crossing distance is collocated with another portion of the Raritan Bay Loop temporary workspace.

[g] The Ambrose Channel and the Tin Can Grounds recreational fishing grounds overlap for about 13.5 acres in the offshore portion of the Raritan Bay Loop in Queens County, New York.

MP = Milepost

N/A = Not applicable

During pipeline construction within 0.25 mile of the areas identified in table 4.7.5-1, indirect impacts such as noise and visual would occur; however, these would be temporary and limited to the time of construction. Construction at existing and new ancillary and aboveground facilities would result in temporary noise impacts, and visual impacts on recreation and special interest areas within 0.25 mile of existing ancillary and aboveground facilities would be similar to those already experienced.

Transco has proposed general mitigation measures for recreation and special interest areas that would be affected by the Project (e.g., public notification protocols), and provided site-specific crossing plans completed in consultation with the applicable land management agency. A discussion of potential impacts on each recreation or special interest area is presented below, as well as mitigation measures that Transco would implement during construction or operation to address impacts. However, based on the impacts identified and the mitigation measures that Transco would implement, we conclude that the Project would not result in significant adverse impacts on recreational or special interest areas.

Muddy Run Recreation Park

The Quarryville Loop would cross the southeast portion of the Muddy Run Recreation Park, which overlaps with the Muddy Run State Game Lands 423 (Muddy Run SGL) at this location (see table 4.7.5-1). Muddy Run Recreation Park is a private park located in Lancaster County on 700 acres of woodland and rolling fields, and includes the 100-acre Muddy Run Hydro Reservoir (Muddy Run Recreation Park, 2016). Public use of the park includes camping, picnicking, basketball, hiking, fishing, and non-motorized boating. The public picnic area and hiking trails are open year-round from sunrise to sunset and campsites are available from March through October.

Land uses at the pipeline crossing consist of forest and open land. The Quarryville Loop would be collocated with Transco's existing pipeline right-of-way where it crosses the Muddy Run Recreation Park. The proposed loop would be about 0.2 mile southeast of the southern edge of the Muddy Run Hydro Reservoir and about 1.7 miles south/southeast from the campground and picnic areas within the park. No hiking trails within the park would be crossed by the Quarryville Loop.

Construction of the Quarryville Loop would temporarily affect about 3.2 acres of the Muddy Run Recreation Park. In addition, Transco would expand its existing MLV facility at MP 1681.0, which would result in the permanent conversion of about 0.2 acre of previously undeveloped land to an industrial use. Following construction, Transco would retain 0.2 acre of new permanent right-of-way adjacent to its existing easement. Collocation of the Quarryville Loop with the existing Transco Mainline through the park would allow Transco to locate a portion of its temporary construction workspace in previously disturbed areas.

Construction of the Quarryville Loop in this area would be expected to occur between the third quarter of 2019 and the second quarter of 2020. Peak use of the park is during the summer months, which would overlap with the period of construction (Muddy Run Recreation Park, 2016). However, most of the recreation areas within the park would be located about 1.7 miles from the temporary construction workspace for the Quarryville Loop and no direct impacts on recreational use of these areas would occur. Temporary increases in noise and dust could occur during the active period of construction within the Muddy Run Recreation Park, but these impacts would be expected to resolve with the completion of construction. Transco would provide Muddy Run Recreation Park personnel with the planned dates and locations of construction activities prior to the beginning work in this area. For operation of the Quarryville Loop, Transco would expand its permanent right-of-way through the park crossing by 25 feet and retain additional permanent easement for operation of the modified MLV facility. Use of the expanded pipeline right-of-way and MLV facility would be consistent with the current land use in this area of the park. For these reasons, impacts on the Muddy Run Recreation Park from construction and operation of the

Quarryville Loop would be temporary, minor, and would be expected to resolve with the completion of construction, with the exception of cleared forested areas within the temporary construction workspace, which would be a long-term impact due to the time it takes for regeneration of forested areas.

Muddy Run State Game Lands 423

The Quarryville Loop would cross Muddy Run SGL (see table 4.7.5-1). State game land in Pennsylvania is managed by the PAGC to preserve wildlife habitat and to promote recreational uses such as hunting and trapping (PAGC, 2017b). Game hunting seasons in this area generally extend from October through December, and from April through May (PAGC, N.D.). The Muddy Run Hydro Reservoir would be about 0.2 mile northwest of MP 1681.3 along the Quarryville Loop, and is the closest recreational feature within the Muddy Run SGL to the Project.

Land uses at the crossing consist of forest and open land. The Quarryville Loop would be collocated with Transco's existing pipeline right-of-way where it crosses Muddy Run SGL. Numerous public roads within the Muddy Run SGL provide access for recreational users. The Quarryville Loop would cross Furniss Road within the Muddy Run SGL at MP 1681.4. Also, the Project would be less than 0.1 mile from an unnamed road at MP 1681.0 and about 0.1 mile southeast of a hunter-access point that is described by the PAGC as having "no restrictions" at MP 1688.6.

Construction of the Quarryville Loop would temporarily affect about 14.7 acres of the Muddy Run SGL, which includes 0.5 acre of land associated with modifications proposed at Transco's existing MLV 195-5 and 2.2 acres associated with Transco's existing permanent right-of-way. In addition, Transco would use a temporary access road during construction that would cross the Muddy Run SGL. The access road and an adjacent ATWS would be used to receive municipal source water for hydrostatic testing.

The expansion of the Transco's existing permanent right-of-way would result in the conversion of some of the forest edges to open, maintained, herbaceous lands. Conversion of forest edges along the existing permanent right-of-way to open, herbaceous land would not be expected to impact recreational use of the Muddy Run SGL. Impacts on recreational use of the Muddy Run SGL could include temporary increases in noise and dust during construction as well as temporary traffic delays in the area when equipment is transported. Also, hunters and other recreational users along Furniss Road and the roads within 0.25 mile of the Project could experience temporary disruptions and views of construction equipment and personnel.

Transco would coordinate with the PAGC to develop measures to minimize disturbance to recreational users of the area, including posting signs at centrally located or designated facilities within the Muddy Run SGL to notify users of the recreational area about the timing and location of planned construction activities. Construction of the Quarryville Loop is scheduled to begin in the third quarter of 2019 and end in the second quarter of 2020, and last for up to 12 months. Construction during this period could overlap with hunting season in the SGL in the fourth quarter of 2019 (see section 4.7.5.1). However, Transco would not restrict access to hunter-access points during construction and operation of the Quarryville Loop and would post signs at the entrance to the hunter-access point to notify users about construction activities.

During operation, Transco would retain an additional 25 feet of permanent right-of-way adjacent to its existing Mainline right-of-way through the area. Modification to existing MLV 195-5 would result in the permanent conversion of about 0.1 acre of undeveloped land to paved or gravel areas within the Muddy Run SGL.

The PAGC has stated that the Muddy Run SGL is privately owned by Exelon Corporation, and that the PAGC leases the land for the SGL. In addition, the PAGC stated that it believes the only impact on the Muddy Run SGL would be to a tenant farmer who farms a portion of the affected workspace with the SGL. Transco stated it would consult with Exelon Corporation and the tenant farmer regarding impacts on the property, and would file the results when they are available. As such, we conclude that impacts would be temporary and minor.

Silver Top Stables

Silver Top Stable is a 105-acre horse farm located on the Ecklin Farm property and offers day camps during the summer and fall (Silver Top Stables, 2017). The Quarryville Loop would cross an agricultural area within the Ecklin Farm property (see table 4.7.5-1) but would not cross the stables or riding corral associated with the property, which are located about 0.1 mile northwest of MP 1682.1 and 0.1 mile northwest of MP 1682.2, respectively.

The temporary construction right-of-way for the Quarryville Loop would affect about 8.9 acres of the Ecklin Farm property. Following the completion of construction, Transco would retain 1.7 acres of new permanent right-of-way adjacent to its existing easement on this property. The pipeline loop would be collocated with the existing Transco Mainline for the entirety of this crossing.

The area of the Ecklin Farm property that would be crossed by the pipeline loop consists of agricultural fields that would be restored in accordance with Transco's Agricultural Construction and Monitoring Plan and allowed to revert to previous uses following the completion of construction. Indirect impact on the stables and other equestrian areas could include temporary increases in noise and dust generated during construction. Noise generated by construction activities and the movement of construction equipment along the right-of-way may disrupt horses and horseback riders. Transco would coordinate with Ecklin Farm and Silver Top Stables to develop mitigation measures to minimize disturbances to equestrian users of the property. Increased noise and dust would be expected to resolve with the completion of construction; therefore, this would constitute a minor, indirect impact on recreational use of the Silver Top Stables. Transco stated it has coordinated with the owner Silver Top Stables to agree on construction and restoration plans for the property. As such, we conclude that impacts would be temporary and minor.

Lancaster County Conservancy Preserves

The Quarryville Loop would cross two properties that are owned by the Lancaster County Conservancy and managed under the Land Protection Program: the Fishing Creek Nature Preserve North and the Wissler Run Nature Preserve (see table 4.7.5-1). Lancaster County Conservancy is a 501(c)(3) charitable organization that purchases lands within Lancaster County with the goal of preserving natural landscapes for public use, enjoyment, and education (Lancaster County Conservancy, N.D.a). Furthermore, the Lancaster County Conservancy serves as the lead external partner, working with the PADCNR, for management of the Susquehanna Riverlands Conservation Landscape, to foster public enjoyment of the Susquehanna River through preservation of the forested river landscape, water quality improvement, and revitalization of river communities (Lancaster County Conservancy, N.D.b). The Conservancy has developed four main programs to support its preservation goals: the Land Protection Program, the Stewardship Program, the Education Program, and the Urban Greening Program. Land uses at the crossings consist of forest and open lands. The Quarryville Loop would be collocated with Transco's existing pipeline right-of-way where it crosses the Conservancy areas.

Fishing Creek Nature Preserve North

The Fishing Creek Nature Preserve North would be crossed by the Quarryville Loop between MPs 1683.5 and 1683.6 (see table 4.7.5-1). In addition, the preserve would be about 0.3 mile southeast of MP 1683.5 of the Quarryville Loop. The Fishing Creek Nature Preserve North is a 167-acre area along Fishing Creek that is managed primarily to maintain a natural vegetative buffer around Fishing Creek (Lancaster County Conservancy, N.D.c). Recreational use of the preserve includes fishing, archery hunting, picnicking, hiking, and horseback riding. The preserve is designated as an “Archery Only” hunting area and rifle or shotgun hunting is not allowed. Archery season in Lancaster County general runs from mid-September through November, and the end of December through January (PAGC, 2017c).

Land uses at the crossing consist of forest and open lands. The Quarryville Loop would be collocated with Transco’s existing pipeline right-of-way where it crosses the preserve.

The preserve has two hiking and equestrian trails (noted as Fishing Creek North Trails in table 4.7.5-1) that travel throughout the preserve. Neither trail would be crossed by the Quarryville Loop, but one trail is located about 0.3 mile southeast of MP 1683.5.

Construction of the Quarryville Loop would temporarily affect about 1.0 acre of the Fishing Creek Nature Preserve North. The Quarryville Loop would be collocated with the existing Transco Mainline for the entire crossing. Following construction, Transco would retain 0.2 acre of new permanent right-of-way adjacent to its existing easement.

As noted above, the Quarryville Loop would cross the Fishing Creek Nature Preserve North, but would not cross the hiking and equestrian trails within the preserve. For this reason, direct impacts on recreational use of the preserve are not anticipated. Potential indirect impacts on the preserve during construction of the pipeline loop could include temporary increases in noise and visual impacts that may disrupt pedestrian and equestrian users of the trail. Transco would plan to construct the Quarryville Loop between the third quarter of 2019 and the second quarter of 2020; this period could overlap with hunting seasons in the preserve in the fourth quarter of 2019. Transco would coordinate with the Lancaster County Conservancy to develop suitable measures to minimize disruption to visitors of the preserve and to ensure construction of the Project does not interfere with game species and habitat management goals within the preserve. To minimize impacts on recreational user of the preserve, Transco would post signs at the entrance of the preserve throughout active construction in the area to notify visitors, including horseback riders and hunters, about the location and timing of construction activities. Impacts on recreational use of the preserve, such as increases in noise, would be temporary and would resolve with the completion of construction; therefore, these impacts would constitute minor, indirect impacts on recreational public use of the preserve.

Wissler Run Nature Preserve

While not crossed by the Quarryville Loop, the Wissler Run Nature Preserve is located less than 0.1 mile southeast of the pipeline loop and Transco’s proposed contractor yard QUAR-CY-LA-1-002 (see table 4.7.5-1). The Wissler Run Nature Preserve was donated to the Lancaster County Conservancy in 1994, and is managed as a wildlife natural resource area (Lancaster County Conservancy, N.D.d). The Conservancy, as the property owner, enrolled the property in the PAGC’s Cooperative Forest-Game Project. Through this program, the PAGC stocks the preserve with pheasants and provides habitat improvements within the preserve (PAGC, 2002).

Recreational use of the preserve includes hunting, hiking, and horseback riding. Hunting is permitted within the preserve during hunting seasons, which are generally mid-September through January for most game species and from late-April through May for spring gobblers (PAGC, 2017c). Access to the preserve is obtained from a parking area off of Furniss Road near the intersection of Furniss Road and River Road. This parking areas is near Transco's existing permanent access road to existing MLV 195-5 at MP 1681.0.

Because the Quarryville Loop and contractor yard would be located less than 0.1 mile from the Wissler Run Nature Preserve, construction and operation of the pipeline loop would not directly affect the preserve. However, the operation and movement of construction equipment to and from the proposed contractor yard could create temporary noise and generate dust that could disrupt horses and horseback riders. Visitors to the preserve may be impacted by traffic along River Road and Transco's existing access road during construction.

Transco would post signs during construction activities to notify visitors to the preserve about the timing and location of planned construction activities and would coordinate with the Lancaster County Conservancy to minimize impacts on visitors. The forested area that separates the preserve and its hiking trails from the temporary construction workspace would screen construction activities from users of the preserve and, for this reason, no visual impacts would be likely to occur. Additionally, because the Quarryville Loop constitutes an expansion of Transco's existing permanent easement, operation of the pipeline loop and retention of additional permanent easement by Transco would not be expected to impact recreational use of the preserve.

Camp Andrews

The Quarryville Loop would be located 0.1 mile southeast of Camp Andrews, which is a year-round youth camp owned and managed by the Camp Andrews Association in Lancaster County (Camp Andrews, N.D.) (see table 4.7.5-1). A forested area separates the proposed pipeline loop from the camp, and the athletic courts and the pool on the property would be located 0.2 mile and 0.3 mile northwest of MP 1683.6, respectively, from the pipeline loop.

The Quarryville Loop would not cross Camp Andrews and no direct impact on visitors to the camp would occur as a result of construction or operation of the pipeline loop. Indirect impacts on visitors to the camp could include temporary increases in noise and dust generated during construction. However, because the pipeline loop would be located about 0.1 mile away from the camp, and more than 0.2 mile away from the main recreational use areas within the camp, and the area between the proposed loop and the camp is predominantly comprised of forest land, significant impacts due to dust and noise would not be expected. Following construction, increases in noise and dust would resolve and impacts on recreational use of Camp Andrews would not be anticipated during operation of the Quarryville Loop.

Tanglewood Manor Golf Club

The temporary construction right-of-way for the Quarryville Loop would cross the Tanglewood Manor Golf Club between MPs 1686.5 and 1686.7 (see table 4.7.5-1). The area crossed by the construction right-of-way is not part of the area used by the public for golfing. Tanglewood Manor Golf Club is a private golf club located near the town of Quarryville in Lancaster County. The club has an 18-hole golf course, driving range, and club house, and hosts a variety of events throughout the year, including about 50 tournaments annually between May and October. Tournaments usually begin between the hours of 7 am and 8 am and about 100 or more golfers typically participate. On non-tournament days, an average of 150 golfers use the facility throughout the day.

Construction of the Quarryville Loop would temporarily affect about 0.1 acre of the Tanglewood Manor Golf Club. The Quarryville Loop would be collocated with the existing Transco Mainline for the entire crossing. Following construction, Transco's permanent right-of-way easement would be outside the limits of the golf course, and no operational impacts would occur.

Indirect impacts such as increases in noise, dust, and visual impacts on users of the golf club would be expected to occur during construction activities. However, most of the Tanglewood Manor Golf Club is separated from the Quarryville Loop by residences and Scotland Road, which would reduce impacts on golf club users. To further minimize impacts, Transco would employ dust suppression techniques such as spraying down the construction area to control fugitive dust during active construction. The increases in noise and visual impacts would resolve with the completion of construction and would, therefore, constitute a temporary, minor, indirect impact on users of the golf club. No impacts on recreational use of the golf club during operation of the Quarryville Loop would occur.

Enola Low Grade Trail

The Quarryville Loop would be located about 0.2 mile southeast of the Enola Low Grade Trail (see table 4.7.5-1). A contractor yard and a temporary access road that would be used during construction of the Quarryville Loop are also located near MP 1691.2 and 1693.7, respectively. The Enola Low Grade Trail (formerly the Atglen-Susquehanna Trail) is a 27.6-mile-long noncontiguous trail extending from the Susquehanna River to Atglen, Pennsylvania (Rails-to-Trails Conservancy, N.D.).

The Enola Low Grade Trail consists of portions of the former Enola Railroad Branch right-of-way that was developed as a rails-to-trails project (Lancaster County Planning Commission, 2009). Each section of the trail is managed by the township through which it passes; the portion of the trail that would be near the Quarryville Loop is managed by Eden Township and the portion of the trail that would be near the contractor yard and access road is managed by Bart Township. The sections of the trail that are currently open for public use can be accessed from dawn to dusk and recreational use of the trail includes biking, walking, jogging, birding, wildlife viewing, and cross-country skiing (Enola Low Grade Rail Trail, N.D.; Rails-to-Trails Conservancy, N.D.; Susquehanna Greenway, 2017). The segment of the trail that is located near the Quarryville Loop is currently open for public use.

The Quarryville Loop would not cross the Enola Low Grade Trail; therefore, construction and operation of the pipeline loop would not directly impact public use of the trail. However, construction of the pipeline loop could cause temporary visual impacts near Hess Road, where the trail is visible through a break in the deciduous tree line along this portion of the trail. In addition, temporary increases in noise during construction due to the proximity of the contractor yard could indirectly impact users of the trail. Transco would use the contractor yard during the entire period of construction along the Quarryville Loop (expected to last for about 12 months). However, increases in noise would be temporary and would resolve with the completion of construction; therefore, these impacts would constitute a minor, indirect impact on recreational use of the trail.

North Bacton Hill Road Field

North Bacton Hill Road Field is located 0.2 mile southeast of existing Compressor Station 200. The field is owned by the Great Valley Association and occasionally used by the Great Valley Little League (Eteamz.com, 2014). The field is separated from the compressor station by existing commercial developments. Public use of the field typically occurs April through October (Great Valley Little League, 2017).

Because the North Bacton Hill Road Field is separated from the compressor station by existing commercial developments, construction and operation of the modifications at Compressor Station 200 would not directly affect recreational use of the field. Transco proposes to complete the modifications at

Compressor Station 200 between the third quarter of 2019 and second quarter of 2020. During the period of active construction, traffic along North Bacton Hill Road could occur from construction vehicles accessing the existing compressor station site. Indirect impacts related to construction at the existing compressor station site could include increases in noise; however, because of the distance between the field and Compressor Station 200, increases in noise during active construction would not be expected to impact recreational use of the field. In addition, increases in noise would resolve with the completion of construction; no impacts on recreational use of the North Bacton Hill Road Field would occur from operation of the facility.

Raritan Bay Cougars Football Field

The Raritan Bay Cougars Football Field is owned and used by the Old Bridge (Raritan Bay) Cougar Pop Warner Association in Middlesex County, New Jersey (Central New Jersey Pop Warner, 2017). Contractor Yard MADI-CY-MI-1-001, which would be used during construction of the Madison Loop, would be 0.2 mile south of the football field. The 0.2-mile area between the contractor yard and the field is comprised of forested land and residential developments. For these reasons, neither direct nor indirect impacts on public use of the football field are anticipated from construction and operation of the pipeline loop.

New Jersey State Conservation Programs and Easements

Green Acres Program

New Jersey created the Green Acres Program in 1961 to address the state's growing recreation and conservation requirements. The goal of the Green Acres Program is to create a network of open spaces and recreational resources for public use and enjoyment. The regulations for the program and for Green Acres properties are provided in Title 7, Chapter 36 of the NJAC (New Jersey.gov, N.D.). No publicly or privately held Green Acres Program properties would be crossed by the Madison Loop in Middlesex County. However, the Madison Loop would be within 0.25 mile of Cheesequake State Park and Veterans Memorial Waterfront Park, and the offshore portion of the Raritan Bay Loop would be within 0.25 mile of Raritan Bay Waterfront Park and Old Bridge Waterfront Park, all of which are Green Acres properties. Discussions of Cheesequake State Park and Veterans Memorial Waterfront Park are provided separately below. Discussions of Raritan Bay Waterfront Park and Old Bridge Waterfront Park are provided in section 4.7.5.2.

New Jersey Environmentally Sensitive Areas and State Planning Areas

In the state of New Jersey, environmentally sensitive areas are designated by the NJDEP and generally consist of large contiguous areas of land that contain valuable ecosystems, geologic features, and wildlife habitat (NJDEP, 2014c). Environmentally sensitive areas are characterized by watersheds of pristine waters, trout streams, and drinking water supply reservoirs; recharge areas for potable water aquifers; habitats of endangered and threatened plant and animal species; coastal and freshwater wetlands; prime forested areas; scenic vistas; and other significant topographical, geological, or ecological features, particularly coastal barrier spits and islands. The environmentally sensitive areas designation is used by local municipalities to determine appropriate land uses within these areas.

The Madison Loop crosses areas between MPs 9.9 and 10.4, and MPs 10.5 and 10.6, that are characterized as State Planning Area 2 – Suburban (or PA2 – Suburban), and proposed Compressor Station 206 is 0.1 mile from an area characterized as a State Planning Area 8 – Parks and Natural Areas (or PA8 – Parks and Natural Areas) (NJDEP, N.D.). These areas are not considered environmentally sensitive, but the state has developed management goals for these areas (New Jersey State Planning Commission, 2001). The management goals for State Planning Area 2 – Suburban are to limit areas of sprawl by consolidating development in existing Centers instead of greenfield areas and, in the process, protecting existing natural resources. State Planning Area 8 – Parks and Natural Areas is comprised of state- and federally owned or managed tracts, and county and local parks identified through Cross-acceptance and map amendment processes (New Jersey State Planning Commission, 2001). The goal for management of these areas is to, "…preserve and enhance areas with historic, cultural, scenic, open space and recreational value" (New Jersey State Planning Commission, 2001).

Construction of the Madison Loop would temporarily impact about 8.3 acres of State Planning Area 2 and, following construction, Transco would retain about 0.1 acre of new permanent right-of-way adjacent to its existing permanent easement through State Planning Area 2. In addition, Transco would use about 0.2 acre of ATWS for the HDD crossing of a stream and wetland within State Planning Area 2; the total area affected by the HDD crossing would be about 0.4 acre. Because the Madison Loop would be collocated with the existing Transco right-of-way through this area, the Project is compatible with the planning goals for State Planning Area 2 and no significant direct or indirect impacts would be anticipated.

State Planning Area 8 is located along the north side of County Road 518 and the permanent access road to Compressor Station 206 extends south from the road. Thus, no significant direct or indirect impacts on State Planning Area 8 would be anticipated and the Project would not conflict with the planning goals for this area.

<u>Conservation Restriction/Easement Golden Age Property</u>

The Madison Loop would be adjacent to a conservation easement on Golden Age property between MPs 11.3 and 11.4 in Middlesex County. This property is designated as a conservation easement under the New Jersey Conservation Restriction and Historic Preservation Restriction Act per New Jersey Statute, Title 13, Chapter 8. The purpose of this designation is to preserve the natural state of properties, including scenic qualities such as natural vegetation and wooded areas, and natural qualities such as wildlife and wildlife habitat, soil and water quality, as well as public recreational uses by forbidding or limiting activities that would alter these qualities. A list of activities that are forbidden or limited on conservation easements under this designation are listed in New Jersey Statute, Title 13, Chapter 8B-2(b) and -2(d). Most applicable to the Project are restrictions on activities such as removal or destruction of trees, shrubs, or other vegetation (Item 2(b)(3)); and excavation, dredging or removal of gravel, soils, or rock (Item 2(b)(4)).

The Madison Loop would be entirely collocated with Transco's existing LNYBL Loop C in this area. Land uses along this segment of the pipeline consist of open land along Transco's existing right-of-way which is bounded on either side by residential developments. Construction of the Madison Loop would not directly impact the conservation easement/Golden Age property, and following construction, Transco would retain about 0.1 acre of new permanent right-of-way adjacent to its existing easement.

Transco consulted with the NJDEP to develop its planned route for the Madison Loop through this area to avoid the easement. Because no direct impacts on the conservation easement would occur, the Project would not conflict with the prescribed preservation goals for this parcel. Indirect impacts that could occur due to construction activities include increases in noise and dust. Increased noise and dust would be expected to resolve with the completion of construction. Therefore, this would constitute a minor, indirect impact on recreational use of the conservation easement.

Cheesequake State Park

The Madison Loop would be 0.2 mile northwest of the Cheesequake State Park's boundary near MP 11.8. Cheesequake State Park is a 1,610-acre park that is owned and managed by the New Jersey State Park Service for recreational and preservation purposes in Middlesex County. The park has recreational facilities that include an interpretive center, hiking and biking trails, and designated camping and picnic areas (NJDEP, 2017d). Public use of the park includes hiking, biking, picnicking, swimming, boating, fishing, hunting, and winter sports. The park is open year-round; however, the camping areas are closed during the winter. In addition to managing the park for public recreational use, the park is enrolled in the Green Acres Program and, as such, the New Jersey State Park Service manages the area to further the goals of New Jersey's Open Space Initiative. Additional discussion of the preservation goals of the Green Acres Program are provided above.

No built facilities or designated campground and picnic areas within the park would be located within 0.25 mile of the Madison Loop. The area of the park that would be closest to the proposed pipeline loop consists of wetlands and tidal creeks. Boat access to the tidal creeks is prohibited, thus these areas are not used by visitors to the park.

Cheesequake State Park is located within deer management zone 50 in New Jersey; deer hunting season in this area extends from October through mid-February (NJDEP, 2013b). Deer hunting is permitted within a Special Deer Hunt Area by special hunting permit only (NJDEP, 2017d).

Because the Madison Loop would not cross Cheesequake State Park, no direct impacts on recreational use of the park would occur. Indirect impacts that could occur due to construction activities include increases in noise and dust. Transco proposes to begin construction during the third quarter of 2019 and continue through the second quarter of 2020. However, because the park would not be crossed by the pipeline loop, no direct impacts on recreational hunting within the park would occur. Transco would coordinate with the New Jersey State Park Service about the location and timing of construction prior to commencing construction activities in areas adjacent to the park. Increased noise and dust would be expected to resolve with the completion of construction; therefore, this would constitute a minor, indirect impact on recreational use of the park.

Veterans Memorial Waterfront Park

Veterans Memorial Waterfront Park is owned and managed by the City of Elizabeth in Union County, New Jersey (City of Elizabeth, N.D.). The park contains a city-run marina that has dry-docking facilities for more than 60 privately owned leisure and fishing boats and hosts an annual Memorial Day Weekend Waterfront Festival that includes rides, games, food, and concerts. The park's boardwalk recreation area contains a fishing pier, tables for chess, bike racks, and benches. In addition, Veterans Memorial Waterfront Park is designated as a Green Acres Program property (see discussion above). The park would be 0.2 mile from the existing C&ME facility that Transco proposes to use as a contractor yard and marine dock during construction of the Raritan Bay Loop.

Use of the contractor yard during construction would not directly impact recreational use of the park. Increased vehicle and marine vessel traffic to and from the contractor yard could cause indirect impacts on recreational users of the park, but these impacts would be temporary, minor, and would resolve with the completion of construction. Transco would notify the City of Elizabeth of its planned construction schedule prior to the commencing construction of the Raritan Bay Loop.

New Jersey Buddhist Vihara and Meditation Center

The 52.3-acre site, on which Compressor Station 206 would be located, abuts a 10-acre parcel owned by the NJBVMC. The NJBVMC serves Buddhists and non-Buddhist for religious, cultural, and social purposes. The NJBVMC includes an outdoor Samadhi (meditation posture) Buddha statue, and the facility holds a Dhamma School for teaching Buddhist values to children two times per month. In May 2017, the NJBVMC broke ground on an 11,000 square-foot building next to the Samadhi Buddha statue that will house a library, residence for clergy, meditation hall, and areas for community gatherings. The expansion plans also call for meditation gardens near the front of the property along Route 27, and a meditation trail through the wooded portion of the property. The expansion project schedule indicates that the meditation trail would be constructed in the second quarter of 2019 (NJBVMC, 2017).

As depicted on figure 4.7.5-1, the NJBVMC parcel is about 1,900 feet deep and 200 feet wide. The Samadhi Buddha statue and new building that is under construction are located on the eastern 2 acres of the parcel, and the remainder of the parcel is wooded. Based on Transco's proposed layout for the compressor station and NJBVMC plans, the meditation trail would be about 450 feet from construction at its nearest point, and the compressor building (the primary source of operational noise) would be approximately 1,225 feet from the meditation trail at its closest point. The compressor building would be about 2,530 feet (0.5 mile) from the Samadhi Buddha statue, at least 1,700 feet of which is comprised of forest.

We received comments regarding the potential for Project construction to impact the NJBVMC. As noted above, the nearest construction activities would be about 0.3 mile from the Samadhi Buddha statue and surrounding facilities, with the intervening distance comprised of forest. Therefore, construction noise and dust would be temporary and minor near the Samadhi Buddha statue and surrounding facilities. We also note that Transco's planned construction at Compressor Station 206 would be typically limited to daylight hours Monday through Saturday and, therefore, would not impact the Dhamma School, which is held on Sundays. The construction of the meditation trail is scheduled for the second quarter of 2019 and would be completed when construction of Compressor Station 206 starts in the third quarter of 2019. It is possible that users of the meditation trail could experience construction noise for up to 15 months during construction at the compressor station, but these impacts would diminish with distance from the compressor station property and would resolve upon completion of construction. Section 4.10.2.2 further describes the noise impacts on the NJBVMC as a result of the project, which are estimated to be approximately 48 dBA day-night sound level (L_{dn}) as construction would occur during daytime hours (7:00 a.m. to 7:00 p.m.) and similar to the noise within an urban residence. Due to the intervening forested area, we would not expect trail users to see construction activity or to experience significant construction related dust. These impacts would also diminish with distance from the compressor station property.

Commenters were also concerned about the potential impact of operating air emissions and noise on users of the NJBVMC. As discussed in section 4.10.1.6, the emissions from Compressor Station 206 would comply with the NAAQS, which were established to protect human health (including children, the elderly, and those with chronic illnesses) and public welfare. Compressor Station 206 would be a minor source of air emissions under federal programs and would comply with applicable federal and state regulations intended to protect air quality. As discussed in section 4.10.2.2, noise modeling indicates that the ambient noise near the Samadhi Buddha statue would increase 0.4 dBA due to normal operation at Compressor Station 206, which is below the threshold of perception for the human ear (3 dBA) Modeling also indicates that operational noise at the nearest point on the meditation trail would be 46.8 dBA L_{dn}, which would be equivalent to the noise heard between a soft whisper and urban residence (see table 4.10.2-1), and complies with our noise requirement of 55 dBA L_{dn}. Operational noise would diminish with distance from the compressor station. Blowdown events would also create noise that could impact users of the NJBVMC. The NJBVMC would be notified in advance of scheduled maintenance blowdowns. Blowdowns would be vented through a silencer, resulting in 45 dBA of noise at the nearest point on the meditation trail.

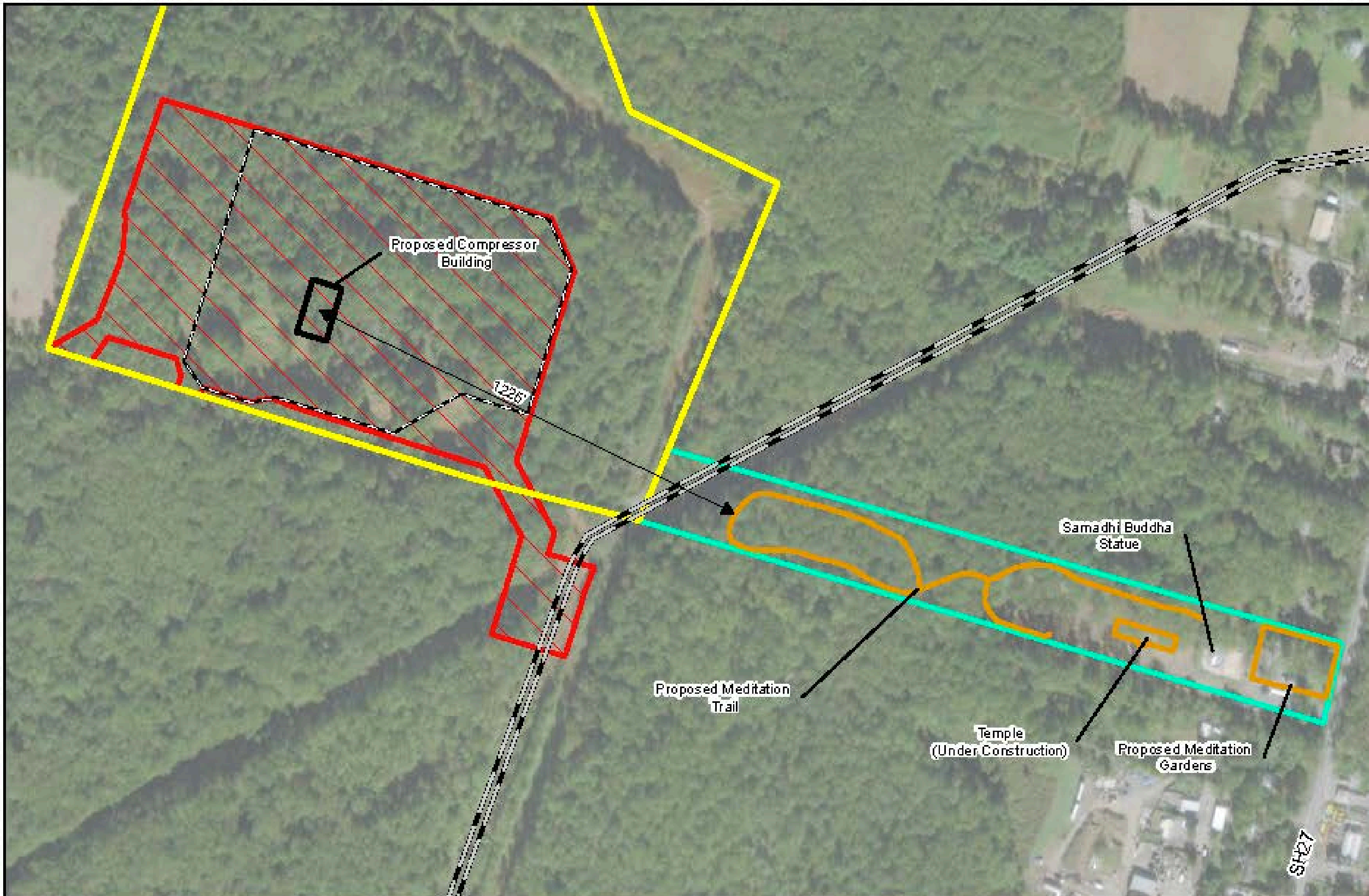

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Figure 4.7.5-1
Northeast Supply Enhancement Project
New Jersey Buddhist Vihara and Meditation Center
Somerset County, New Jersey

- Compressor Station 206 Property Boundary
- Compressor Station 206 Workspace
- Compressor Station 206 Fence line
- NJBVMC Property
- Existing Transco Pipeline

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Based on the above, we conclude that construction related impacts on users of the NJBVMC would be minor and temporary, and would diminish with distance from the compressor station site. Operation of Compressor Station 206 would also not have a significant impact on users of the NJBVMC as air emissions would comply with applicable regulations that are protective of public health, and noise should be relatively minor in proximity to the Samadhi Buddha statue, and would comply with our noise requirements at the nearest point of the meditation trail to the compressor station.

4.7.5.2 Offshore

New Jersey and New York State-owned Submerged Land

The offshore portion of the Raritan Bay Loop would cross both New Jersey and New York state-owned submerged land. New Jersey and New York state-owned submerged lands provide public opportunities for various recreational activities such as fishing, whale watching, and scuba diving. A description of the each of these activities is presented below and a discussion of the potential impacts the proposed Project may have on these activities and mitigation measures that Transco would implement to address impacts is presented in each discussion. A discussion of recreational vessel traffic is presented in section 4.7.7.

In Middlesex County, New Jersey, about 976.2 acres of state-owned submerged land would be used as temporary construction workspace for the Raritan Bay Loop, and in Monmouth County, New Jersey, about 2,750.2 acres would be used as temporary construction workspace. In Richmond County, New York, about 6,603.8 acres of state-owned submerged land would be used as temporary construction workspace, and in Queens County, New York, about 3,835.2 acres state-owned submerged land would be used as temporary construction workspace. The offshore areas crossed by the Raritan Bay Loop and ancillary facilities are primarily used for commercial and recreational fish and shellfisheries, commercial navigation, and other recreational uses as discussed below and in section 4.7.7.

<u>Recreational and Sport Fishing</u>

Table 4.7.5-1 lists the recreational and sport fishing areas that would either be crossed by or within 0.25 mile of the offshore portion of the Raritan Bay Loop. In total, seven prime recreational ocean fishing areas, mapped by the NJDEP, would be crossed by the pipeline loop. The fishing areas include the Ambrose Channel in both New Jersey and New York waters; the Unnamed Fishing Grounds in New Jersey and federal waters; Between the Channel and Sandy Hook Channel Grounds in New Jersey waters; and Tin Can Grounds, Gong Grounds, and Scallop Ridge in New York waters (see figure 4.5.2-1). All of the recreational fishing areas are adjacent to the Ambrose Channel and are characterized by a sandy and shelly bottom substrate. Recreational fishermen commonly target fish species such as scup, summer flounder, and striped bass in these areas.

In Monmouth County, New Jersey, Transco would use about 507.1 acres within the Ambrose Channel fishing grounds as temporary construction workspace and an additional 39.9 acres of temporary construction workspace within the Between the Channels fishing grounds.

Of the recreational fishing areas that would be crossed by the Raritan Bay Loop in Queens County, New York, Transco would use about 170.5 acres of temporary construction workspace within the Ambrose Channel, about 211.8 acres of temporary construction workspace within the Tin Can Grounds, about 11.8 acres of temporary construction workspace in the Gong Grounds, and about 45.3 acres of temporary construction workspace in the Scallop Ridge fishing grounds (see table 4.7.5-1). The Ambrose Channel and the Tin Can Grounds fishing areas overlap for about 13.5 acres within the temporary construction workspace for the Raritan Bay Loop.

Construction of the offshore portion of the Raritan Bay Loop could disrupt access to recreational fishing grounds. Transco anticipates that construction activities within the recreational fishing grounds would occur sporadically over the course of construction. Transco would provide notice of Project construction schedules and locations to recreational fishermen through Local Notices to Mariners, notices in local newspapers, and coordination with the USCG Waterways Management Coordinator, prior to the start of construction in these areas.

Transco's proposed offshore construction would cross recreational fishing areas. Transco would discourage recreational fishing within the safety zone (i.e., within approximately 0.5 mile of construction areas, as described in Transco's Offshore Safety Measures) surrounding the temporary construction workspace during periods of active construction, but would allow recreational fishing in these areas when construction is inactive. To further minimize impacts on recreational fishermen during construction, Transco would implement the safety measures outlined in its Offshore Safety Measures Plan to ensure the safety of all marine users operating in the vicinity of the construction of the Raritan Bay Loop. Temporary disruption of access to fishing grounds within the safety zone would not be expected to have a significant impact on recreational fishing in New Jersey and New York waters, due to the number of additional fishing grounds available in areas adjacent to the proposed construction workspace. Furthermore, these impacts are expected to be temporary, minor, and to resolve with the completion of construction.

Commercial Whale Watching

The Raritan Bay Loop also crosses offshore waters in New Jersey and New York that are used for commercial whale watching. Commercial whale watching areas are divided into two main categories: general use areas and dominant use areas (Northeast Ocean Data, N.D.). General use areas are defined as the full footprint where whale-watching activity has occurred between 2010 and 2014, regardless of the frequency or intensity of whale-watching activity, while dominant use areas are defined as areas within the general use area that are routinely used for whale-watching activity. Data used to distinguish general from dominant use areas comes from the information gathered by whale-watching industry experts that was included in the Northeast Coastal and Marine Recreational Use Characterization Study, which was conducted under the direction of the Northeast Regional Planning Body (Northeast Regional Planning Body, 2015).

In New Jersey, about 2,716.1 acres of the general use area for commercial whale-watching in Monmouth County would be used by Transco as temporary construction workspace for the Raritan Bay Loop. In New York, about 3,011.5 acres of the general use area in Richmond County, and about 3,835.2 acres in Queens County would be used by Transco as temporary construction workspace. The temporary construction workspace for the Raritan Bay Loop would not cross the dominant use areas for commercial whale watching in New Jersey, but about 1,719.0 acres of the dominant use area would be within the temporary construction workspace in Queens County, New York. Following the completion of construction, Transco would retain about 14.9 acres of permanent right-of-way in New Jersey and 18.1 acres of permanent right-of-way in New York that are within the general use area. In addition, Transco would retain about 9.8 acres of permanent right-of-way within the dominant use area in New York.

The primary season for recreational whale-watching in Raritan Bay is between April and November, with peak whale-watching occurring during the summer months. Offshore construction of the Raritan Bay Loop would begin in the second quarter of 2020 and continue for about 9 months, which would overlap with the primary and peak whale-watching season. During construction, Transco would use Local Notices to Mariners and would coordinate with the USCG Waterways Management Coordinator, to provide all charter vessel operators, including whale-watching operators, ample notice of Project construction schedules and locations. Transco would discourage whale-watching vessels from entering the construction safety zones along the Raritan Bay Loop during construction, which could interfere with whale-watching opportunities in these areas. However, the area affected by the Project workspace would be relatively small, affecting about 0.07 percent of the dominant use area and 0.02 percent of the general use area. Areas outside of the construction safety zone for the Raritan Bay Loop would remain accessible for public whale-watching opportunities. Therefore, impacts on whale-watching opportunities from construction of the Raritan Bay Loop would be minor and temporary and would resolve with the completion of construction. Following construction, use of whale-watching areas would be allowed to continue as before. Additional details regarding impacts and mitigation for offshore uses in the pipeline loop area are presented in section 4.7.7.

Recreational SCUBA Diving and Snorkeling Areas

The offshore Raritan Bay Loop also crosses through recreational snorkeling and scuba diving areas just south of Rockaway Point in Queens County, New York. These areas were identified by members of the Mid-Atlantic Regional Council on the Ocean, including the state of New Jersey, during participatory GIS workshops that were conducted in 2012 to collect information on how the public uses the coastal and ocean spaces (Mid-Atlantic Ocean Data Portal, N.D.; Northeast Regional Planning Body, 2015).

The Raritan Bay Loop would not cross any areas defined as dominant use areas for snorkeling and scuba diving, but could cross areas that may be used for occasional snorkeling or scuba diving activities. The temporary workspaces associated with the Raritan Bay Loop would cross about 6 percent of the identified recreational snorkeling and scuba diving area that may be used for occasional snorkeling or scuba diving activities. Thus, Project construction would not have a significant impact on snorkeling and scuba diving opportunities. Transco proposes to begin offshore construction in the second quarter of 2020 and to continue for 9 months, during which time recreational users would be advised of the location and schedule of construction through Local Notices to Mariners and coordination with the USCG Waterways Management Coordinator. In addition, Transco would provide all charter vessel operators, including dive operators, notice of Project construction schedules and locations.

Raritan Bay Waterfront Park

Offshore construction of the Raritan Bay Loop would begin approximately 0.2 mile from the Raritan Bay Waterfront Park, a 136-acre park in Middlesex County, New Jersey that is managed by the county for recreational purposes. Recreational areas within the park include athletic fields, walking, and biking paths and a Raritan Bay Overlook and performance gazebo, as well as a memorial for victims of terrorism (Middlesex County, 2014a). In September of each year, the city of South Amboy holds a Seafood Festival at the park. About 86 acres of the park are comprised of wetlands that are designated as a New Jersey environmentally sensitive area and are also part of the Green Acres program (see section 4.7.5.1). The wetland areas within the park provide an opportunity for park visitors to explore the unique flora and fauna within the park (Middlesex County, 2014a). The temporary construction workspace for the offshore portion of the Raritan Bay Loop near MP 12.1 would be less than 0.1 mile southeast of the wetland area within the park. In addition, the temporary construction workspace for installation of the CP system for the Raritan Bay Loop would be about 0.2 mile away from the park.

Because the park would not be crossed by the proposed Raritan Bay Loop, neither construction nor operation of the Project facilities would be expected to directly impact the park or these designations. Increased noise during construction could cause indirect impacts on recreational users of the park, but these impacts would be temporary, minor, and would resolve with the completion of construction. In addition, the pipeline loop and CP system would be installed using the HDD which would further limit the potential for indirect impacts on the park.

Offshore construction of the Raritan Bay Loop would begin in the second quarter of 2020 and continue for about 9 months, which would overlap with the South Amboy Seafood Festival at the park.

However, construction of the pipeline loop is not expected to impact public attendance of the festival. Transco would notify Middlesex County of its planned construction schedule prior to the commencement of construction in this area.

Old Bridge Waterfront Park

Old Bridge Waterfront Park is a 67-acre waterfront property located on land owned by Old Bridge Township and managed by Middlesex County in New Jersey. The park contains a boardwalk, a beach, an environmental education trail, and a fishing pier (Middlesex County, 2014b). The property is part of the Green Acres program and the northwestern portion of the park is designated as a New Jersey environmentally sensitive area (see section 4.7.5.1). The temporary construction workspace for the offshore portion of the Raritan Bay Loop near MP 12.3 is about 0.1 mile northeast of Old Bridge Waterfront Park.

Construction and operation of the pipeline loop would not directly impact recreational use of the park. Increased noise during construction could cause indirect impacts on recreational users of the park, but these impacts would be temporary, minor, and would resolve with the completion of construction. In addition, the pipeline loop would be installed using the HDD in this area which would further limit indirect impacts related to construction. Transco would notify Middlesex County of its planned construction schedule prior to the commencement of construction in this area.

4.7.6 Coastal Zone Management Act

Based on a review of the Pennsylvania Coastal Zone Management Program maps, the Project falls outside of the geographical boundaries of the Pennsylvania Coastal Zone and, therefore, is not subject to coastal consistency (PADEP, 2017e). Portions of the Project in New York and New Jersey would, however, be located within a coastal zone, as listed in table 4.7.6-1 and discussed further below.

TABLE 4.7.6-1

Coastal Management Zones Crossed by the Northeast Supply Enhancement Project

State/Facility/County	Begin Milepost	End Milepost	Distance Crossed (miles)
New Jersey			
Onshore			
Madison Loop			
Middlesex County	10.7	10.7	<0.1
	11.3	11.9	0.4
	11.9	12.0	0.1
Raritan Bay Loop			
Middlesex County	12.1	12.2	<0.1
Offshore			
Raritan Bay Loop			
Middlesex County	12.2	14.0	1.9
Monmouth County	14.1	14.7	0.6 [a]
	26.6	30.6	4.1
New York			
Offshore			
Raritan Bay Loop			
Queens County	25.0	26.6	1.6
	30.6	35.5	4.9
Richmond County	14.0	25.0	10.9 [a]

[a] This includes a portion of the offshore Raritan Bay Loop temporary workspace between approximate MPs MP 14.1 and 14.7.

4.7.6.1 New Jersey

New Jersey’s coastal zone consists of portions of 8 counties and 126 municipalities whose boundaries include the Coastal Area Facility Review Act area and the New Jersey Meadowlands District (NJDEP, 2016e). Based on a review of the New Jersey Coastal Management Program coastal zone maps, the Madison Loop would cross an area of tidal wetlands associated with the New Jersey Coastal Zone, and portions of the onshore and all of the offshore portion of the Raritan Bay Loop would be located within the New Jersey Coastal Zone.

New Jersey’s Coastal Management Office administers the planning and enhancement aspects of New Jersey's federally approved Coastal Management Program, and the NJDEP’s Land Use Regulation Program reviews coastal permit applications submitted to the NJDEP, reviews permit applications submitted under the Freshwater Wetlands Protection Act, and conducts federal consistency reviews.

Transco continues to consult with the NJDEP to determine which of the enforceable coastal zone policies apply to the Project. The consistency of the Project with the CZMA would be determined by the NJDEP in conjunction with Transco’s Waterfront Development permit application. On June 27, 2017, Transco submitted its consistency assessment to the NJDEP and on July 7, 2017, Transco submitted its Waterfront Development permit application to the NJDEP. Transco resubmitted its consistency assessment and Waterfront Development permit applications to the NJDEP on June 20, 2018.

To ensure the Project is consistent with CZMA, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary documentation of concurrence from the NJDEP that the Project is consistent with the CZMA.**

As listed in section 5.2, Transco is required to file documentation verifying it has received all applicable authorizations required under federal law (or evidence of waiver thereof) prior to construction of the Project, if approved.

4.7.6.2 New York

New York’s coastal zone consists of four geographic regions: Long Island, New York City, Hudson Valley, and Great Lakes (NYSDOS, 2012). Based on a review of the New York State Coastal Management Program coastal zone maps, the entire offshore portion of the Raritan Bay Loop would be located within the New York Coastal Zone (NYSDOS, 2017). More specifically, based on Transco’s consultations with the NYSDOS and New York City Department of City Planning, the entire offshore portion of the Raritan Bay Loop in New York lies within the New York City Waterfront Revitalization Program (NYCWRP) area.

The NYSDOS administers the New York State Coastal Management Program, which requires that state agency actions within the coastal zone be undertaken in a manner consistent with the state’s coastal area policies or a state-approved Local Waterfront Revitalization Program. When a proposed project is located within the coastal zone and it requires a local, state, or federal discretionary action, a determination of the project’s consistency with the policies and intent of the Local Waterfront Revitalization Program must be made before the project can move forward. Both the local policies and the state’s Coastal Management Program policies would apply to the Project (Maraglio, 2016).

Because the Project is located within the NYCWRP area, the New York City Department of City Planning would review the Project’s consistency with the Coastal Management Program in conjunction with Transco’s permit application. On June 27, 2017, Transco submitted its Joint Permit Application to the

NYSDOS and New York City Department of City Planning, which included a coastal zone consistency assessment. Transco submitted subsequent updates to the NYSDOS and New York City Department of City Planning on September 18, 2017, July 2, 2018, and October 5, 2018.

To ensure the Project is consistent with CZMA, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary documentation of concurrence from the NYSDOS and New York City Department of City Planning that the Project is consistent with the CZMA.**

As listed in section 5.2, Transco is required to file documentation verifying it has received all applicable authorizations required under federal law (or evidence of waiver thereof) prior to construction of the Project, if approved.

4.7.7 Offshore Uses

The Ambrose Channel is the primary navigation channel into and out of Raritan Bay and the Lower New York Bay and is known for having heavy ship traffic. Further, Raritan Bay in general is frequented by commercial and recreational fish and shellfisheries operations. Data from the 2012 Northeast Recreational Boater Survey conducted by Sea Plan and the Northeast Regional Ocean Council indicate that most of the offshore Project facilities would cross areas of high recreational boating density (Northeast Ocean Data, N.D.). In New Jersey, most recreational boaters transit from marinas located on Cheesequake Creek, Stump Creek, and Matawan Creek, including Morgan Marina, Raritan Marina, Brown's Point Marina, and Wagner's Twin Towers Marina. In New York, popular marinas include Atlantis Marina and Yacht Club and the Nichols Great Kills Marina located in Great Kills Harbor. These marinas are all located within 10 miles of the offshore portion of the Raritan Bay Loop. There are also protected coves and inlets near Cheesequake Creek that may attract recreational boaters.

Given the typically high level of recreational boat traffic near the offshore Raritan Bay Loop, recreational boat traffic is expected in the vicinity of the offshore Raritan Bay Loop during construction. Some potential impacts from construction of the offshore pipeline on recreational marine uses due to the increased vessel traffic associated with construction activities are anticipated. The following discusses the potential impacts on vessel traffic, subsea utilities, and dredge disposal areas resulting from construction and operation of the Project. Impacts on designated recreational features and areas (e.g., whale watching, SCUBA diving) along the Raritan Bay Loop are discussed further in section 4.7.5.

4.7.7.1 Vessel Traffic

In addition to the fishing activities discussed in section 4.7.5, vessel traffic in Raritan Bay includes commercial shipping and recreational boating. Sections 2.3.3.1 and 4.8.7.3 describe the estimated marine vessel traffic resulting from construction of the Project and current vessel traffic in the area, respectively. Construction-related vessel traffic along the waterways between the proposed contractor yard and the offshore workspace would temporarily increase during construction, but the total number and frequency of vessel trips for the Project would be small, typically less than 10 vessel trips per day on most days. The crew and escort boats would make daily trips between the shore and the offshore construction site. The pipe transport barges (and the four tug boats that support them) would travel between the contractor yards and the offshore construction site once per day during pipe laying activities. The dive support vessel could make daily trips to and from the work area if it docks in the harbor at night, but the vessel would be capable of anchoring in the work area overnight. Based on other recent projects in the area such as the Rockaway Delivery Lateral Project, it is anticipated that the fuel barge (and the tug boats that support it) would make about one trip per week to the work area to refuel vessels and equipment. The other vessels, including the clamshell barge, jack-up barge, and pipe lay barge (and associated tug boats) would remain at the offshore construction area for the duration of their work. Based on similar impacts from the Rockaway Delivery Lateral Project, the addition of these vessel trips for the NESE Project is not expected to have a significant impact on commercial vessel traffic or channel congestion.

Impacts on commercial ship traffic would be short term and mainly limited to a safety zone around the temporary workspace that would be used for offshore construction and the circular area with a radius of 2,500 feet that would be used during commissioning of the pipeline. Vessels would be advised to avoid the safety zones during the offshore construction period and the commissioning period. A Special Notice to Mariners would be submitted to the USCG to advise commercial vessels of the construction schedule and location of the restricted area, which would be marked by buoys and monitored by escort boats. These temporary restrictions are not expected to adversely affect commercial shipping because there is ample room in the surrounding area for ships to transit to and from local harbor destinations. Additionally, there would be constant communication between construction vessels and other boat traffic to ensure that adequate safety margins are maintained.

Recreational boating that does occur in the area would be subject to the same restrictions imposed on commercial vessels as discussed above. Recreational boaters would have access to the same Special Notice to Mariners that would be available to fishermen and commercial ships. Therefore, no significant impacts on recreational boating are expected.

Restrictions on recreational and commercial vessel traffic during operation of the Raritan Bay Loop would be the same as for fishing vessels and minor. Specifically, recreational boats and commercial vessels would be advised to avoid a small area in the vicinity of the subsea hot-tap for a 5-day maintenance period approximately once every 7 years for internal pipeline inspections.

4.7.7.2 Subsea Utilities

Transco initially identified 19 submerged historic and/or modern cable lines that would be crossed by the offshore portion of the Raritan Bay Loop, including 9 early 20th century telegraph cables, 9 submarine communication or electrical transmission cables, and the Neptune Cable (2 crossings), a 21st century electrical transmission cable (see table 2.3.3-4). Transco subsequently determined that the 18 historic cables would not be affected by the Project. Transco developed a site-specific Cable Crossing Plan for the two crossings of the Neptune Cable. Section 2.3.3.7 describes in more detail the offshore utility crossing methods proposed for the Project. While a draft Cable Crossing Plan has been provided, the plan has not been finalized and evidence of consultations with the cable owners is pending. Therefore, **we recommend that:**

- **<u>Prior to construction of the offshore portion of the Raritan Bay Loop</u>, Transco should with the Secretary, for review and written approval of the Director of OEP, the final Cable Crossing Plan for the Neptune Cable and documentation of Transco's consultation with the cable owner regarding the plan.**

4.7.7.3 Dredge Disposal Sites

Also as discussed in section 2.3.3.9, Transco would dispose of dredge material derived from excavations in less than 15 feet of water to avoid creating a navigation hazard as required by the USACE. On September 13, 2017, Transco submitted an application to the USACE for a permit under section 103 of the MPRSA to dispose of dredge material at the HARS, a 15.7 square nautical mile area in the Atlantic Ocean, approximately 7.7 nautical miles south of Rockaway, New York. The HARS previously received contaminated sediments and other materials during 63 years of disposal activity, and the USACE is now capping the area with dredged material that meets USACE and EPA chemical and physical criteria that would not cause significant undesirable effects, including through bioaccumulation.

Transco's section 103 application included the results of grain size and chemical analysis that Transco conducted on sediment samples obtained from areas that would require dredge disposal. Based on these results, Transco identified six areas from which the dredge material would not meet HARS disposal criteria, and has proposed that dredge from these areas be disposed of at a permitted onshore facility. For dredge material that is approved for disposal at the HARS, Transco also committed to conduct hydrodynamic sediment transport modeling to analyze sediment plume distribution in accordance with USACE and EPA testing guidance. The USACE's review of Transco's section 103 application is not yet complete.

In section 4.5.2.8, we recommend that Transco provide final information regarding dredge disposal sites for the offshore segment of the NESE Project prior to construction.

4.7.8 Landfills and Contaminated Sites

4.7.8.1 Onshore

Various resources were accessed to identify contaminated sites in proximity to the onshore segments of the NESE Project, including a sponsored search of publicly available local, state, and federal environmental databases by Environmental Data Resources, Inc. (EDR) (EDR, 2016a; 2016b; 2016c); agency websites; and other public websites. Table 4.7.8-1 list landfills and contaminated sites within 0.25 mile of the Project.

Based on the EDR reports for the Quarryville Loop (EDR, 2016a), Compressor Station 200 (EDR, 2016b), the onshore Raritan Bay Loop, and the Madison Loop (EDR 2016c), and information from the New Jersey Open Public Records Act database (NJDEP, 2016c), seven landfills and/or sites with soil and/or groundwater contamination were identified within 0.25 mile of the Madison Loop and onshore Raritan Bay Loop; one site with soil and groundwater contamination was identified within 0.25 mile of Compressor Station 206.

The regulatory database review did not identify any landfills or sites with confirmed soil or water contamination within 0.25 mile of the Quarryville Loop or Compressor Station 200 (EDR, 2016a; 2016b; 2016c; 2016d; EcolSciences, Inc., 2016a). However, in our review of Transco's New York Bay Expansion Project (FERC Docket No. CP15-527), we found that Transco conducted a comprehensive assessment of the Compressor Station 200 site in the 1990s and identified PCBs, hydrocarbons, mercury, and other heavy metals in site soils. Following the removal of all contamination, the PADEP issued a release letter on March 24, 1998, indicating that no further action was required.

TABLE 4.7.8-1

Landfills and Contaminated Sites Within 0.25 Mile of the Northeast Supply Enhancement Project

State/County/ Facility	Site Name	Location: Nearest Milepost	Location: Distance from Centerline (miles)	Location: Direction from Workspace	Location: Workspace Upgradient or Downgradient of Site [a]	Type/Database [b]
New Jersey						
Middlesex County						
Madison Loop	Road Department Garage Area 3-1	9.50	<0.1	North	Downgradient	NJ Release, NJ Brownfields
	Sommers Landfill	10.0	<0.1	South	Upgradient	New Jersey Hazardous Waste Site, under evaluation for remaining contamination
	Global Sanitary Landfill	10.1 – 10.4	<0.1	South	Upgradient	NPL; Capped Superfund Site
	Cheesequake Compost Site	[c]	[c]	[c]	[c]	New Jersey Historical Landfill
	Morgan Ordnance Depot	11.1	0.3	North	Downgradient	FUDS
	1788 Route 35 in Sayreville, NJ	12.0	<0.1	Northeast	Downgradient	SHWS/HIST HWS, NJ Release, NJ Spill
	Morgan Fire House [d]	12.0	<0.1	South	Upgradient	SHWS/HIST HWS, NJ Release
Somerset County						
Compressor Station 206	Higgins Farm Superfund Site	N/A	Adjacent	West	Downgradient	NPL

[a] Transco evaluated contour lines from topographic maps to determine the difference in elevation from the workspace to the site to determine the likely flow path of groundwater (USGS, 2017b).

[b] Database IDs:

<u>FUDS</u> – Formerly Used Defense Sites. The Department of Defense is responsible for the environmental restoration of properties that were formerly owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense prior to October 1986.

<u>NJ Brownfields</u> – Brownfields sites are identified as former or current commercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of contamination to the soil or groundwater at concentrations greater than the applicable cleanup criteria.

<u>NJ Release</u> – New Jersey Hazardous Material Release database is a record of the initial notification information reported to the NJDEP's Action Line.

<u>NJ Spill</u> – All HazMat known or unknown spills to the ground reported to the NJDEP's Action Line.

<u>NPL</u> – National Priorities List database, also known as Superfund, is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the United States Environmental Protection Agency.

<u>SHWS/HIST HWS</u> – State Hazardous Waste Sites/Historic Hazardous Waste Sites – Known Contaminated Sites in New Jersey database is a municipal listing of sites where contamination of soil and/or groundwater is confirmed at levels more than the applicable cleanup criteria or standards. Remedial activities are under way or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination are unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring.

<u>SEMS</u> – Superfund Enterprise Management System.

[c] Madison Township; Exact location could not be verified but identified within 2-mile-wide search radius.

[d] The Morgan Fire House is listed on both the NJDEP Active Sites with Confirmed Contamination list and the NJDEP Closed Sites with Remediated Contamination list. The site is included on the Known Contaminated Site list but is classified as no further action (restricted use) with an active deed notice in the NJDEP post-remediation group.

Source: EDR, 2016a, 2016b, 2016c; EcolSciences, Inc., 2016a, 2016b.

Road Department Garage Area 3-1

The Middlesex County Road Department Garage Area 3-1 is located along Route 9 North in Old Bridge Township, New Jersey, about 0.1 mile north of MP 9.5 along the Madison Loop (NJDEP, 2016c). The site had two leaking fuel tanks removed on October 13, 1993. The property was assigned to the New Jersey Brownfields Program on August 31, 1994 as a known source of groundwater contamination (New Jersey State, 2015).

Global Sanitary Landfill and Sommers Landfill

The Madison Loop traverses the northern perimeter of the Global Sanitary Landfill between approximate MPs 10.1 and 10.4 (EPA, 2016a), and the Sommers Landfill is southwest and adjacent to the Global Sanitary Landfill (further from the Madison Loop). The Global Sanitary Landfill is a 57.5-acre area that was used for solid waste disposal between 1968 and 1984 by the Global Landfill Reclaiming Corporation (EPA, 2016b), at which point operations ceased after a landfill side-slope failure destroyed several acres of adjacent wetlands. The site was placed on the EPA National Priorities List (NPL) in 1989 due to the presence of contaminated leachate and the discovery of buried drums containing hazardous waste. The EPA issued a Record of Decision which included remedial action objectives for addressing contaminant migration (VOCs and semi-volatile organic compounds, pesticides, and metals) from the landfill into groundwater, surface water, sediment, and soil. The EPA's Record of Decision established a Classification Exception Area (CEA),[29] which also acts as a Well Restriction Area (WRA) for both the upper and lower water-bearing zones in the areas where contaminants were detected, and 5-year reviews of the site to determine whether additional action is required to protect groundwater quality. A CEA is established to ensure that uses of an aquifer are restricted until constituent standards are achieved. When contaminant concentrations in a CEA exceed maximum contaminant levels, and designated aquifer use based on classification includes potable use, the NJDEP identifies the CEA as a WRA. The WRA functions as the institutional control by which potable use can be affected. The CEA for the Global Sanitary Landfill site restricts groundwater use from the ground surface to 25 feet bgs in the upper water-bearing zone and from the ground surface to 150 feet bgs, depending on contamination depth, which is in the lower water bearing zone (NJDEP, 2016d).

In July 2015, a 5-year review was completed by the EPA and it was determined that the CEA and WRA are currently protecting human health and the environment because all human and ecological exposure routes have been addressed. However, additional data collection is necessary to determine if the remedy would be protective in the long-term (EPA, 2016a).

The New York Bay Expansion Project referenced above included the replacement of three short segments of LNYBL Loop C totaling 0.25 mile between MPs 10.0 and 10.4. Our review of the New York Bay Expansion Project found that the LNYBL Loop C was rerouted around the perimeter of the Global Sanitary Landfill in 1995 to avoid contamination associated with the landfill. The CEA and WRA for the Global Sanitary Landfill site are now located less than 100 feet south of the Madison Loop (NJDEP, 2016d).

Cheesequake Compost Site

The exact location of the Cheesequake Compost site was not determined but information from EDR indicates that the facility occurs within 2 miles of the Madison Loop. The compost site is identified by the

[29] A designation established whenever groundwater standards in a particular area are not met. It ensures the use of the groundwater in that area is restricted until standards are achieved (NJDEP, 2017e).

NJDEP as a historical landfill, but the facility does not occur on any other databases indicative of soil and groundwater contamination.

Morgan Ordnance Depot

The Morgan Ordnance Depot site is about 0.3 mile north of MP 11.1 along the Madison Loop (NJDEP, 2016c). On October 4, 1918, an explosion occurred at the T.A. Gillespie Company Shell Loading Plant (also known as the Morgan Ordnance Depot). Although the site is more than 0.25 mile from the Madison Loop, explosive debris continues to surface regularly within a 1.2-mile radius of the former depot. Since December 17, 1995, the site has been listed as a USACE Formerly Used Defense Site with confirmed contamination. The USACE's Formerly Used Defense Site GIS public database shows that the site's contamination area includes a portion of the Madison Loop between Route 9 to the Raritan Bay shoreline (USACE, 2013b).

1788 Route 35 in Sayreville, New Jersey

The property located at 1788 Route 35 North in South Amboy, New Jersey, is about 0.1 mile northeast of MP 12.0 along the Madison Loop and less than 0.1 mile north of MP 12.0 along the Raritan Bay Loop (NJDEP, 2016c). The property has historically been, and currently is, a gas station that is listed on the underground storage tank active remediation list (NJDEP, 2016c). This site contains an active NJDEP CEA and WRA that extends within 200 feet northeast of the Madison Loop and 165 feet north of the Raritan Bay Loop (NJDEP, 2016d), and which is in effect until October 2026.

Morgan Fire House

The Morgan Fire House property is about 0.1 mile south of MP 12.0 along the Madison Loop and about 0.1 mile southwest of MP 12.0 along the Raritan Bay Loop (NJDEP, 2016c). Contamination at this site has been attributed to a leaking 550-gallon underground storage tank that contained medium diesel fuel (#2-D). The site is listed on both the NJDEP Active Sites with Confirmed Contamination list and the NJDEP Closed Sites with Remediated Contamination list (NJDEP, 2016c). The site is included on the Known Contaminated Site list but is classified as no further action (restricted use) with an active deed notice and engineering controls in the NJDEP post-remediation group.

E.I. Dupont Denemours and Company Site

In addition to the sites listed in table 4.7.8-1, the E.I. Dupont Denemours and Company property is located about 1.2 miles northwest of the Madison Loop. Although the site is located greater than 0.25 mile from the Project, this site contains an active NJDEP CEA and WRA due to VOC and metal contamination in groundwater that overlaps the Madison Loop between approximate MPs 9.2 and 10.3 (NJDEP, 2016d) and was identified by Transco as a potential site for further investigation (NJDEP Site Remediation Program ID Number 008222) (NJDEP, 2016c).

Transco identified three groundwater monitoring wells associated with the E.I. Dupont Denemours and Company site near MP 10.2, and one groundwater monitoring well near MP 9.9 along the Madison Loop.

Higgins Farm

The Higgins Farm NPL site is located west and adjacent to the 55.3-acre site on which Compressor Station 206 is proposed. Contaminated soil and drums were removed from the Higgins Farm site in August 1992 under an EPA removal program. Subsequent soil and groundwater sampling identified VOCs and metals as the primary contaminants of concern at the site. The EPA implemented a bioremediation system to address remaining soil contamination at the site, and a groundwater extraction and treatment system to reduce contaminant concentrations and minimize further contaminant migration (EPA, 2018). The EPA's groundwater monitoring well network includes four wells on the Compressor Station 206 site. Groundwater contamination associated with the Higgins Farm site is further discussed in section 4.3.1.6. In general, the contaminant plume is about 400 feet from construction workspaces and about 850 feet from the proposed compressor building (see figure 4.3.1-1). Limited groundwater sampling by Transco confirmed the presence of one VOC compound at a concentration below NJDEP drinking water criteria in the immediate vicinity of the mapped groundwater plume from the Higgins Farm site. Transco reviewed its construction plans with the EPA, which is assisting us in our environmental review of the NESE Project. The EPA finds, and we agree, that construction and operation of Compressor Station 206 as proposed by Transco is unlikely to impact EPA's ongoing cleanup operations at the site.

4.7.8.2 Offshore

Raritan Bay Slag Site

In addition to the onshore sites listed in table 4.7.8-1, the RBS NPL site is located predominantly offshore of Old Bridge Township and Sayreville, New Jersey. More specifically, the site is about 1.5 miles long and consists of waterfront areas between Margaret's Creek to the south and just beyond the western jetty at the Cheesequake Creek inlet to the north. In the late 1960s and early 1970s, metal slag and battery casings were deposited along the beachfront in this area, resulting in elevated metal concentrations in near shore soils and offshore sediments. In 2013 the EPA issued a Record of Decision specifying certain offshore areas for remediation, with a lead cleanup goal in sediments of 400 mg/kg.

On August 15, 2017, Transco met with the EPA to discuss proposed offshore construction activities within the RBS. In summary, the exit pit for the Morgan Shore Approach HDD would be in RBS Areas 7 and 11, and about 1,000 feet of the Raritan Bay Loop pre-lay trench would cross RBS Area 11. Seven sediment samples collected by Transco from the proposed excavations in Areas 7 and 11 were analyzed for lead and other potential contaminants, and none of the samples exceeded the lead cleanup goal of 400 mg/kg. Transco also noted that the nearest area designated for cleanup is more than 200 feet from proposed excavations. As discussed in section 4.7.7.3, to avoid creating a navigation hazard as required by the USACE, Transco proposes to dispose of sediments excavated from less than 15 feet of water (which would include the RBS area) at the HARS or another approved site. Transco would replace the excavated sediment with sandy backfill from approved source(s).

In its comments on the draft EIS, the EPA recommends that Transco continue to consult with the agency regarding construction near the RBS NPL site.

4.7.8.3 Impacts and Mitigation

Pre-existing contaminated soil and groundwater could potentially be encountered during construction of the Madison Loop, and construction of the Raritan Bay Loop between the approximate MP 12.5 (the exit pit for the Morgan Shore Approach HDD) and MP 12.7 would encounter contaminated sediments associated with the RBS site. It is not expected that pre-existing contamination would be encountered during construction of the Quarryville Loop, Compressor Station 200, or Compressor Station 206. Improper management of pre-existing contaminated media could potentially spread or remobilize contaminants, affecting soil and water quality and biologic resources.

Transco developed an Unanticipated Discovery of Contamination Plan that describes how potential contaminants would be recognized during construction and specifies the steps that would be implemented to assess and respond to the contamination (see table 2.3-3). These steps may include work stoppage to assess the situation; laboratory sampling; containment of excavated contaminated soil; and disposal at permitted facilities, if necessary. Water suspected of being contaminated would not be discharged without prior state approval. We have reviewed the Unanticipated Discovery of Contamination Plan and find that implementation of the plan would avoid or adequately minimize potential impacts associated with handling unanticipated, pre-existing, onshore contaminated media. As noted above, Transco recently replaced three short segments of LNYBL Loop C between MPs 10.0 and 10.4. During trenching, Transco encountered potentially contaminated water which was containerized and analyzed prior to subsequent disposal in accordance with applicable permit conditions. Transco complied with our recommendation in the draft EIS to file a final Materials and Waste Management Plan that details the specific measures, including regulatory coordination, that Transco plans to take to properly manage contaminated groundwater.

Transco Materials and Waste Management Plan was developed in accordance with the guidelines set forth in the NJDEP's Linear Construction Project Technical Guidance, dated January 2012. The plan describes how contaminated and hazardous materials sites were identified along the Project; the location of these sites in relation to the Project facilities; potential additional site investigations prior to construction; excavated material and water handling and management for specific tracts that may have contaminated or hazardous materials; and the reporting requirements following construction of the Project. We reviewed Transco's Materials and Waste Management Plan, agree that it would reduce the spread of known contaminated and hazardous materials, and find it acceptable.

Transco is continuing to consult with the EPA regarding construction in the RBS site. Based on the discussion of the potential impacts that resuspension of contaminated sediments in section 4.5.2.8, we conclude that there is a low risk of adverse effects on aquatic resources from exposure to resuspended contaminants, but recommend that Transco provide final information regarding dredge disposal sites for the offshore segment of the NESE Project prior to construction.

4.7.9 Visual Resources

4.7.9.1 Existing Visual Character and Condition

4.7.9.2 Pipeline and Ancillary Facilities

Visual resources along the proposed onshore pipeline loops are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. Although stretches of upland forest are present along the proposed routes, 97 percent of the Quarryville Loop and 100 percent of the Madison Loop would be installed within or parallel to Transco's existing rights-of-way. Construction within or adjacent to existing rights-of-way reduces the severity of impacts on visual resources because it minimizes vegetation clearing for the construction work areas and permanent right-of-way and also minimizes new fragmentation of vegetation. These rights-of-way are maintained periodically on different schedules, using different methods of maintenance. As a result, along the majority of the Quarryville and Madison Loops, visual resources have been previously affected by other activities.

Visual impacts associated with onshore construction would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting (if required), and machinery and tool storage. Drilling equipment would also be visible at the entry and exit points for the three HDDs along the Madison Loop, as well as for the Morgan Shore Approach HDD and the Short and Long CP Power Cable HDDs. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts are typically greatest where the pipeline routes parallel or cross roads and may be seen by passing motorists, and on residences where vegetation used for visual screening of existing utility rights-of-way or for ornamental value would be removed. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The impact of vegetation clearing would be shortest in areas consisting of short grasses and scrub-shrub vegetation and in agricultural crop and pasture lands, where the re-establishment of vegetation following construction would be relatively fast (generally less than 3 years). The impact would be greater in forest land, where temporary workspace and ATWS would take many years to regenerate mature trees; forest would be prevented from re-establishing on the permanent right-of-way.

The proposed activities at MLVs 195-5, 195-10, and 200-55 would occur at existing valve sites where a facility already exists. Vegetation and land use conditions at new, proposed MLVs 195-8 and 200-59 consist of agricultural and open land, respectively. The agricultural land at proposed MLV 195-8 (MP 1687.9 along the Quarryville Loop) consists primarily of row and field crops. The site is about 200 feet from Church Road to the east. The open land at proposed MLV 200-59 (MP 11.9 along the Madison Loop) consists primarily of existing rights-of-way with sparse vegetation and areas paved with gravel. The site is bordered by apartment buildings to the north (buildings about 100 feet away), commercial buildings to the east (300 feet) and west (over 500 feet), and open land to the south. Old Spye Road is located about 300 feet east of the site. Construction and operation of the proposed MLVs would result in a permanent conversion to industrial/commercial land.

After construction, all onshore disturbed areas would be restored and returned to preconstruction conditions in compliance with federal, state, and local permits; landowner agreements; and Transco's easement requirements, with the exception of aboveground facility sites, discussed further below.

The offshore portion of the Raritan Bay Loop would be in open ocean waters that support both commercial and recreational activities such as shipping, fishing, whale watching, and recreational boating. Visual impacts associated with the offshore portion of the Project would occur for about 9 months during which HDD onshore-to-offshore construction activities would be visible from nearby residences, businesses, and roadways. The HDD entry point for the Morgan Shore Approach HDD and Short CP Power Cable HDD consists of an undeveloped, vacant parcel and the HDD entry point for the Long CP Power Cable HDD is located at Transco's existing Morgan M&R Station

Offshore construction vessels and platforms would be visible from residential neighborhoods and, outside of the shore-to-water HDD, would appear relatively small where offshore construction would begin about 0.2 mile from shore. Offshore platforms and support vessels used in trenching and pipe lay operations would be visible from the shore for a majority of the construction period. Once construction is completed, the area would be restored to pre-construction conditions, access to all pre-construction commercial and recreational fishing areas would be restored, and, because the pipeline would be installed underwater, no additional visual impacts would occur during operation of the pipeline. Therefore, visual resource impacts associated with construction and operation of the offshore portion of the Project would be negligible and temporary.

4.7.9.3 Aboveground Facilities

Aboveground facilities associated with the Project would be the most visible features and would result in long-term impact on visual resources. The magnitude of these impacts depends on factors such as the existing landscape, the remoteness of the location, and the number of viewpoints from which the facility could be seen.

Proposed modification activities at existing Compressor Station 200 would occur within the property line at the already developed site. No permanent changes to the current visual landscape would occur from modifications to the existing compressor station.

Vegetation and land use conditions at the proposed Compressor Station 206 site consist of upland forest and wetland with some land classified as transportation. The site is bordered on the west by open and agricultural land; the three other sides are bordered by upland forest. County Road 518 is located about 1,500 feet west and Route 27 is located about 1,750 feet east of the site. Compressor Station 206 would be surrounded by a perimeter fence for security purposes. Lighting would be present at the main gates, yards, and all building entry and exit doors, and would have directional control or be positioned in a downward position to minimize their visibility from local residences and their effects on migratory birds, while maintaining Occupational Safety and Health Administration (OSHA) standards for lighting.

Several properties along County Road 518 and Route 27 could potentially have views of Compressor Station 206. The buildings on the west side of County Road 518 face east-southeast and would not have a direct view toward the proposed compressor station. Buildings east of Route 27 would be shielded from views of the compressor station due to tree cover.

Transco provided a visual simulation of the proposed compressor station from two locations where the facility has the potential to be visible; one as viewed from the adjacent property to the west and one as viewed from the border with the NJBVMC property to the east. Visual simulations were done for both summer (tree leaves on) and winter (tree leaves off) months. At both locations and for both seasonal scenarios, a vegetation buffer would remain such that the proposed Compressor Station 206 would be not be visible from these viewpoints.

In general, construction and operation of the aboveground facilities would result in a minor long-term to permanent impact on the surrounding existing visual character of the Project area. However, impacts are not considered significant given the nature of the already developed visual character of the area and/or vegetative visual screening that would exist following construction.

4.7.9.4 Contractor Yards and Access Roads

The contractor yards would be located primarily in existing agricultural fields or previously disturbed areas that would not require land use modifications; however, tree removal would be required at two yards (QUAR-CY-LA-1-002 and MADI-CY-MI-1-001) to accommodate construction buildings, materials, vehicles, and equipment.

In addition to using existing public roads, Transco proposes to construct new or modify existing roads at 26 locations to access the construction right-of-way or aboveground facilities. Of these, five new roads would be constructed for temporary use and four new roads would be constructed for permanent aboveground facility access during operations. The existing non-public access roads are aggregate or dirt roads that may be improved as needed for construction and operations/maintenance.

The primary visual impact associated with the proposed contractor yards would be the storage of equipment, materials, and heavy machinery during Project construction. All of these uses would be temporary and generally concurrent with pipeline construction activities. Upon completion of construction, the contractor yards would be restored in accordance with Transco's Plan and Procedures. As a result, there would be no permanent impacts on visual resources associated with the use of these yards. Use of the contractor yards would result in a minor and temporary (for open and agricultural land uses) to long-term (for forested areas) impact on the surrounding visual character of the Project area.

Twenty-one of the roads to be modified are existing and, therefore, use as access roads would not result in significant increased impacts on visual resources. Five proposed new temporary roads would not result in a significant impact on visual resources as they would be restored following construction. However, four proposed new permanent roads would remain. The establishment of the new permanent access roads would constitute a permanent visual impact. However, due to the generally developed nature of the Project area, the new roads would not be inconsistent with similar roadways in the area and, thus, construction and, where applicable, permanent use of the access roads would not result in a significant impact on visual resources in the area.

4.8 SOCIOECONOMICS

The potential socioeconomic effects of construction and operation of the NESE Project include changes in population levels or local demographics, increased employment opportunities, increased demand for housing and public services, tourism and transportation impacts, and an increase in government revenue associated with sales, payroll, and property taxes. Additionally, section 4.8.10 provides an analysis of environmental justice for the Project in accordance with CEQ guidelines (1997) for federal agency actions.

4.8.1 Socioeconomic Study Area

The socioeconomic study area considered for this analysis includes the counties, cities, townships, and boroughs traversed by the proposed onshore and offshore Project facilities. The Quarryville Loop would traverse Drumore, East Drumore, and Eden Townships in Lancaster County, Pennsylvania. The Madison Loop would traverse Old Bridge Township and Sayreville Borough in Middlesex County, New Jersey. The onshore segment of the Raritan Bay Loop would also traverse Sayreville Borough in Middlesex County, New Jersey.

The socioeconomic study area also includes East Whiteland Township, Chester County, Pennsylvania and Franklin Township, Somerset County, New Jersey, the locations of Compressor Stations 200 and 206, respectively.

For the offshore segment of the Raritan Bay Loop, which would traverse Monmouth County, New Jersey and Richmond and Queens Counties, New York, this analysis considers socioeconomic impacts only as they relate to population and demographics, economics, tourism, and transportation. The impacts on population, housing, public services, revenues, and environmental justice for the offshore segment of the Raritan Bay Loop have not been considered in this analysis due to the following reasons:

- All offshore construction activities would base out of an existing contractor yard in Elizabeth City in Union County, New Jersey and therefore no shore-based facilities would be in Monmouth County, New Jersey and Richmond and Queens Counties, New York.
- Offshore construction personnel work schedules are such that these workers would work for multiple weeks on and then multiple weeks off duty. The offshore workers would be

housed offshore for their weeks on duty for the duration of their employment on the Project. Our experience suggests that offshore workers return home during off duty weeks and therefore would not need accommodations or require use of public services onshore in the Project study area during their employment.

- The offshore portion of the Raritan Bay Loop would require no permanent employees for operation.

The socioeconomic statistics for the Project's socioeconomic study area are provided below by county, and where appropriate, city, township, and borough.

4.8.2 Population and Employment

Tables 4.8.2-1 and 4.8.2-2 present summaries of demographic and socioeconomic conditions in the Project study area, respectively.

The Quarryville Loop would be in Lancaster County, Pennsylvania with a population of 530,216 people. The Quarryville Loop would cross East Drumore, Drumore, and Eden townships where populations range from 2,047 in Eden Township to 3,839 in East Drumore Township. The population density in Lancaster County is 550.4 persons per square mile. Major industries in Lancaster County and the townships are educational, health, and social services; manufacturing; and retail trade. The third largest industry in East Drumore Township is agriculture, forestry, fishing and hunting, and mining. Lancaster County has a large Amish community and a strong farming industry. The county-level civilian workforce is 276,565 with a county-level unemployment rate and per capita income of 6.1 and $27,158 respectively. The townships that would be crossed by the Quarryville Loop have similar per capita incomes to that of the county, however, they have small civilian workforce populations and low unemployment rates, ranging from 2.2 to 4.2 percent.

The Madison Loop and the onshore portion of the Raritan Bay Loop would be in Middlesex County, New Jersey with a population of 830,300 persons and a population density of 2,621.6 persons per square mile. Middlesex County is a densely populated urban county located southwest of New York City. The Madison Loop would cross through Old Bridge Township with a population of 66,594. The Madison and onshore portion of the Raritan Bay Loop would be in Sayreville Borough with a population of 44,051. Major industries in Middlesex County are educational, health, and social services; professional services; and retail trade. The county-level civilian workforce is 435,528 with a county-level unemployment rate and per capita income of 7.5 and $34,674 respectively. The township and borough that would be crossed by the Madison Loop have similar per capita incomes of $38,266 and $34,094 and unemployment rates of 7 to 8.2 percent respectively.

The offshore portion of the Raritan Bay Loop would traverse Monmouth County, New Jersey and Richmond and Queens counties, New York. Monmouth County has a population of 629,185 and a population density of 1,344.7 persons per square mile. Richmond and Queens Counties are densely populated, with population density of 8,030.3 to 20,553.6 persons per square mile and populations of 472,481 and 2,301,139 respectively. Major industries in these counties are educational, health, and social services; professional services; retail trade; and arts.

TABLE 4.8.2-1

Existing Population Levels and Trends for the Northeast Supply Enhancement Project Study Area

Facility/Location	2010 Population [a]	2015 Population Estimate [b]	Population Density (persons/sq. mi) (2010) [a]	Population Change 2010 - 2015 (percent)
UNITED STATES	**308,745,538**	**316,515,021**	**7.4**	**2.5**
Pipeline Facilities				
Pennsylvania	**12,702,379**	**12,779,559**	**283.9**	**0.6**
Quarryville Loop				
Lancaster County	519,445	530,216	550.4	2.1
Drumore Township	2,560	2,596	106.5	1.4
East Drumore Township	3,791	3,839	163.9	1.3
Eden Township	2,094	2,047	167.1	-2.2
New Jersey	**8,791,894**	**8,904,413**	**1,195.5**	**1.3**
Madison Loop				
Middlesex County	809,858	830,300	2,621.6	2.5
Old Bridge Township	65,375	66,594	1,717.7	1.9
Sayreville Borough	42,704	44,051	2,695.7	3.2
Raritan Bay Loop (Onshore)				
Middlesex County	809,858	830,300	2,621.6	2.5
Sayreville Borough	42,704	44,051	2,695.7	3.2
Raritan Bay Loop (Offshore)				
Monmouth County	630,380	629,185	1,344.7	-0.2
Union County	536,499	548,744	5,216.1	**2.3**
Elizabeth City	124,969	127,759	10,144.1	**2.2**
New York	**19,378,102**	**19,673,174**	**411.2**	**1.5**
Raritan Bay Loop (Offshore)				
Richmond County	468,730	472,481	8,030.3	0.8
Queens County	2,230,722	2,301,139	20,553.6	3.2
Aboveground Facilities				
Pennsylvania	**12,702,379**	**12,779,559**	**283.9**	**0.6**
Compressor Station 200				
Chester County	498,886	509,797	664.7	2.2
East Whiteland Township	10,650	10,699	973.8	0.5
New Jersey	**8,791,894**	**8,904,413**	**1,195.5**	**1.3**
Compressor Station 206				
Somerset County	323,444	330,604	1,071.7	2.2
Franklin Township	62,300	64,779	1,350.0	4.0

[a] U.S. Census Bureau, 2010.
[b] Source: U.S. Census Bureau, 2015.
[c] All offshore construction activities would be based out of an existing contractor yard in Elizabeth, New Jersey.

TABLE 4.8.2-2				
Existing Economic Conditions for the Northeast Supply Enhancement Project Study Area				
Facility/Location	Per Capita Income (U.S. Dollars) [a]	Civilian Labor Force [a]	Top Three Industries [a, b]	Unemployment Rate [a]
Pipeline Facilities				
Pennsylvania	$29,291	6,516,882	E,M,R	7.9
Quarryville Loop				
Lancaster County	$27,158	276,565	E,M,R	6.1
Drumore Township	$27,279	1,192	M,E,R	3.5
East Drumore Township	$24,513	1,743	E,M,Ag	2.2
Eden Township	$22,784	1,010	E,C,R	4.2
New Jersey	$36,582	4,695,103	E,P,R	8.8
Madison Loop				
Middlesex County	$34,674	435,528	E,P,R	7.5
Old Bridge Township	$38,266	37,737	E,R,F	7.0
Sayreville Borough	$34,094	24,339	E,P,R	8.2
Raritan Bay Loop (Onshore)				
Middlesex County	$34,674	435,528	E,P,R	7.5
Sayreville Borough	$34,094	24,339	E,P,R	8.2
Raritan Bay Loop (Offshore)				
Monmouth County	$43,469	333,439	E,P,R	7.9
Union County [c]	$35,508	296,786	E,P,R	9.8
Elizabeth City	$18,826	67,222	E,T,R	11.3
New York	$33,236	10,083,719	E,P,R	8.2
Raritan Bay Loop (Offshore)				
Richmond County	$32,041	224,499	E,P,R	6.9
Queens County	$26,876	1,208,386	E,A,R	8.6
Aboveground Facilities				
Pennsylvania	$29,291	6,516,882	E,M,R	7.9
Compressor Station 200				
Chester County	$42,556	276,983	E,P,M	5.9
East Whiteland Township	$40,568	6,180	P,E,F	4.3
New Jersey	$36,582	4,695,103	E,P,R	8.8
Compressor Station 206				
Somerset County	$48,791	181,012	E,P,M	6.0
Franklin Township	$40,861	35,355	E,P,M	6.4

[a] U.S. Census Bureau, 2016.

[b] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: A = Arts, Entertainment, and Recreation, and Accommodation and Food services; Ag = Agriculture, Forestry, Fishing, and Hunting, and Mining; C = Construction; E = Educational, Health and Social Services; F = Finance and Insurance, and Real Estate and Rental and Leasing; I = Information; M = Manufacturing; O = Other Services, except Public Administration; P = Professional, Scientific, Management, Administrative, and Waste Management Services; Pu = Public Administration; R = Retail Trade; T = Transportation and Warehousing, and Utilities; W = Wholesale Trade.

Compressor Station 200 is in East Whiteland Township in Chester County, Pennsylvania. The population of the township is 10,699 with a population density of 973.8. Major industries in Chester County are educational, health, and social services; professional services; and manufacturing. The county-level civilian workforce is 276,983 with a county-level unemployment rate and per capita income of 5.9 and $42,556 respectively. East Whiteland Township has a civilian workforce population of 6,180, a per capita income of $40,568, and unemployment rate of 4.3 percent.

Compressor Station 206 would be in Franklin Township in Somerset County, New Jersey. The population of the township is 64,779 with a population density of 1,350. Major industries in Somerset

County are educational, health, and social services; professional services; and manufacturing. The county-level civilian workforce is 181,012 with a county-level unemployment rate and per capita income of 6 and $48,791 respectively. Franklin Township has a civilian workforce population of 35,355, a per capita income of $40,861, and unemployment rate of 6.4 percent.

Construction of the Project would temporarily increase the population in the general Project area. Table 4.8.2-3 lists the size of the estimated construction workforce for the Project. Based on the current proposed schedule, the highest concentration of workers would occur from the third quarter of 2019 through the first quarter of 2020. Workforce numbers would vary at any given facility during the construction period depending on the activity, but maximum workforce numbers for the onshore portion of the Project are estimated at 621 total workers at peak construction. For the Raritan Bay Loop, workforce numbers are estimated to range from a low of 150 to a high of 300 workers during construction. The peak construction workforce across all onshore Project components would total approximately 621 workers, with a peak offshore construction workforce of approximately 300 workers.

TABLE 4.8.2-3

Estimated Workforce and Duration for Northeast Supply Enhancement Project Construction

Facility	County/State	Construction Duration (months)	Maximum Workforce	Average Workforce
Onshore Facilities				
Pipeline				
Quarryville Loop	Lancaster, PA	7	294	245
Madison Loop	Middlesex, NJ	5	162	135
Aboveground Facilities				
Compressor Station 200	Chester, PA	9	77	52
Compressor Station 206	Somerset, NJ	10	88	66
Offshore Facilities				
Raritan Bay Loop (Offshore) [a]	Union, NJ	9	150-300	225

[a] The construction workforce for the onshore portion of the Raritan Bay Loop has been included in the workforce numbers for the offshore portion of the Raritan Bay Loop. The onshore and offshore portions of this pipeline loop would be built as a single facility, based out of a contractor yard in Elizabeth City, New Jersey.

As shown in table 4.8.2-4, the non-local workforce for the onshore Project components would account for an increase of less than 1 percent of the population for all counties crossed by the Project.

TABLE 4.8.2-4

Estimated Local and Non-Local Construction Workforce by Northeast Supply Enhancement Project Component

Facility	County/State	Maximum Local Workforce [a]	Maximum Non-Local Workforce	Total Construction Workforce	Maximum Non-Local Workforce as a Percentage of County Population
Onshore Facilities					
Pipeline					
Quarryville Loop	Lancaster, PA	191	103	294	0.02
Madison Loop	Middlesex, NJ	105	57	162	0.01
Aboveground Facilities					
Compressor Station 200	Chester, PA	23	54	77	0.01
Compressor Station 206	Somerset, NJ	26	62	88	0.02

[a] Assumes 65 percent of pipeline construction workforce and 30 percent of compressor station construction workforce would be local.

Transco estimates that 621 total workers would be used to build the onshore components of the Project during peak construction. Transco estimates that 35 percent (160 workers) of the construction workforce used for construction of the Quarryville and Madison Loops and 70 percent (116 workers) of the construction workforce for the compressor stations would be non-local hires. The effect on the population in the counties crossed by the Project would be equal to the total number of non-local construction workers plus any family members accompanying them. Pipeline construction is mobile and of short duration. In our experience, most non-local workers would not travel with their families to the Project area. Based on the populations of the counties in the Project area, the increase in population due to the influx of the non-local workforce would be negligible and temporary. Transco estimates that 345 construction workers would be local hires. This would result in a negligible and temporary reduction in the unemployment rates in the Project area for the duration of construction.

Transco would hire two new employees to operate and maintain Compressor Station 206 in Somerset County, New Jersey. If these hires were non-local, this would result in a permanent but negligible increase in the population of Somerset County. No other permanent hires are anticipated for the operation of other Project components.

4.8.3 Housing

Table 4.8.3-1 provides select housing statistics for the Project study area. Though the number of vacant rental units in the townships and boroughs crossed by the Project is small, particularly in the Lancaster County townships, the county-level availability of rental units is much larger. Lancaster County has a rental vacancy rate of 4.1 percent with 2,600 vacant units for rent. Middlesex County has a rental vacancy rate of 4.6 percent and 4,900 vacant units for rent. There are approximately 2,500 vacant units for rent in Chester County and a rental vacancy rate of 5 percent. Somerset County has a rental vacancy rate of 9.7 percent and 3,000 vacant units for rent.

The availability of temporary housing in the Project area may fluctuate during the tourist season or local events as well as due to demand on housing from other industries. In addition to rental units, temporary housing is available in the form of daily, weekly, and monthly rentals in hotels, motels, and RV parks/campgrounds. An approximate number of these short-term accommodations in the Project area is presented in table 4.8.3-1.

As previously discussed, construction of the onshore components of the Project would, at peak construction, require approximately 276 non-local workers during the 10-month construction period. Using a conservative estimate of 25 units per hotel/motel or campground, of which there are approximately 253, we estimate that there are at least 6,325 rooms/sites available for short-term housing in the Project study area. Given the rental vacancy rates in the counties in the Project study area and the number of hotel/motel/campsites available, there are sufficient short-term housing options to meet the increase in demand caused by the influx of the non-local construction workforce. In the event the number of rental or short-term housing accommodations identified in the Project study area does not meet the need within a particular county, it can be reasonably expected that construction workers could find housing options in the nearby areas within commuting distance such as Harrisburg or York, Pennsylvania or Newark or Trenton, New Jersey. These areas provide many options for hotels and motels if options are not available in smaller communities in the study area, and would be sufficient to accommodate the estimated non-local construction workforce.

TABLE 4.8.3-1

Available Housing in the Northeast Supply Enhancement Project Study Area

Facility/Location	Total Housing Units [a]	Owner Occupied [a]	Renter Occupied [a]	Vacant Housing Units	Vacant Housing Units for Rent	Rental Vacancy Rate (%) [a]	Hotels and Motels [b, d]	RV Camp-grounds [c, d]
Pipeline Facilities								
Pennsylvania	**5,585,611**	**3,431,790**	**1,527,069**	**626,752**	**97,321**	**5.9**		
Quarryville Loop								
Lancaster Co.	205,587	134,548	60,782	10,257	2,653	4.1	97	28
Drumore Township	861	692	151	18	0	0.0		
East Drumore Township	1,415	1,040	267	108	0	0.0		
Eden Township	670	506	137	27	0	0.0		
New Jersey	**3,577,942**	**2,056,107**	**1,133,379**	**388,456**	**74,304**	**6.1**		
Madison Loop								
Middlesex Co.	297,940	181,312	100,746	15,882	4,905	4.6	50	-
Old Bridge Township	25,316	16,467	7,566	1,283	251	3.1		
Sayreville Borough	16,732	10,562	5,079	1,091	265	4.8		
Aboveground Facilities								
Pennsylvania	5,585,611	3,431,790	1,527,069	626,752	**97,321**	5.9		
Compressor Station 200								
Chester Co.	194,892	139,807	46,250	8,835	2,465	5.0	43	3
East Whiteland Township	3,637	2,426	1,125	86	55	4.6		
New Jersey	**3,577,942**	**2,056,107**	**1,133,379**	**388,456**	**74,304**	**6.1**		
Compressor Station 206								
Somerset Co.	124,672	88,277	27,721	8,674	3,014	9.7	32	-
Franklin Township	25,397	16,425	7,207	1,765	445	5.7		

a U.S. Census Bureau, 2016.
b Sources: NJ Dept. of State, 2016; LancasterPA.com, 2017a; Chester County Conference and Visitors Bureau, 2017a.
c LancasterPA.com, 2017b; Trails.com, 2017; Chester County Conference and Visitors Bureau, 2017b; PA Campground Owners Assoc., 2016.
d Hotel/motel/campground data collected at county level only.
\- None listed.

The influx of non-local construction workers to the Project study area would result in a minor, temporary increase in the demand for rental housing and/or hotel/motel rooms and campground sites. The Project could have a short-term, positive impact on the area rental industry through increased demand and higher rates of occupancy; however, no significant impacts on local housing markets are expected. Increased demand in the Project study area could benefit the proprietors of the local motels, hotels, and other rental units through increased revenue; however, it could increase competition (and cost) for short-term housing and could decrease housing availability for tourists, recreationalists, and local renters or residents. While some construction activity would be conducted during the peak tourism season, sufficient temporary housing is still likely to be available for tourists; however, it may be more difficult to find (particularly on short notice) and/or more expensive to secure.

Based on the number of accommodations in the Project study area and surrounding areas, we have determined that rental housing accommodations along with hotels, motels, and campgrounds, would be sufficient to house the non-local construction workforce without significantly impacting or displacing tourists or local renters and residents. The increase in demand for short-term housing from non-local construction workers during the construction of onshore components of the Project would be temporary and minor. In addition, we conclude that the two employees needed during operation of Compressor Station 206 would have a negligible impact on housing resources in the project area.

4.8.4 Public Services

Public services and facilities in the counties in the Project study area include full-service law enforcement, paid and volunteer fire departments, hospitals, and schools. Table 4.8.4-1 provides an overview of select public services available by county in the Project study area. All counties in the Project study area have numerous police and fire departments and at least one hospital.

TABLE 4.8.4-1

Public Services Available in the Northeast Supply Enhancement Project Study Area

Facility/Location	Fire and Rescue Units [a]	Nearest Distance to Mainline/ Facility (miles)	Law Enforcement Agencies [b, c]	Nearest Distance to Mainline/ Facility (miles)	Acute Care Hospitals [d]	Nearest Distance to Mainline/ Facility (miles)
Pipeline Facilities						
Pennsylvania						
Quarryville Loop						
Lancaster County	79	1.0	33	2.1	4	13.7
New Jersey						
Madison Loop and Raritan Bay Loop (onshore)						
Middlesex County	68	0.02	26	6.8	6	3.9
Aboveground Facilities						
Pennsylvania						
Compressor Station 200						
Chester County	49	1.0	45	1.5	5	4.3
New Jersey						
Compressor Station 206						
Somerset County	48	0.5	20	10.3	1	4.5

[a] FireDepartment.net, 2017; Chester County, 2016; Township of Franklin, 2017a; Borough of Sayreville, 2017; Drumore Township, 2017; Quarryville Fire Company, 2017; Rawlinsville Volunteer Fire Company, 2017; Robert Fulton Volunteer Fire Company, 2017; DeMarco, Vicki, 2017.

[b] East Whiteland Township, 2017; Township of Franklin, 2017b; Drumore Township, 2017; Pennsylvania State Police, 2017; DeMarco, Vicki, 2017; Sayreville Police Department, 2017.

[c] Includes County sheriff's office.

[d] PA Dept. of Health, 2015; NJ Dept. of Health, 2017; NY State Dept. of Health, 2017a; NY State Dept. of Health, 2017b.

In Lancaster County there are 33 police departments, 79 fire and rescue units, and four acute care hospitals. The closest police department to the Quarryville Loop is 2.1 miles away in the city of Havre de Grace; the nearest fire department is 1 mile away in Quarryville; and the closest hospital is in Lancaster approximately 13.7 miles away.

In Middlesex County there are 26 police departments, the closest of which to both the Madison and Raritan Bay (onshore) loop is in Highland Park approximately 6.8 and 8.6 miles from the Project components, respectively. Of the 68 fire and rescue units in Middlesex County, the closest to the Madison Loop is approximately 0.5 mile away in Old Bridge Township while the closest to the Raritan Bay Loop (onshore) is approximately 0.1 mile away in South Amboy. The closest hospital to both the Madison and Raritan Bay Loops is in Perth Amboy, approximately 3.8 miles from both Loop locations.

There are 45 police departments, 49 fire and rescue units, and 5 acute care hospitals in Chester County. The closest police department to Compressor Station 200 is 1.5 miles away in East Whiteland; the nearest fire department is 1 mile away in East Whiteland; and the nearest hospital is 4.3 miles away in Paoli.

There are 20 police departments, 48 fire and rescue units, and one acute care hospital in Somerset County. The closest police department to the proposed location of Compressor Station 206 is the South Brunswick Police Department in Monmouth Junction, the nearest fire department is 1 mile away in Princeton (the Kingston Volunteer Fire Company), and the nearest hospital is 4.5 miles away in Plainsboro.

Based on the total number of police, fire stations, and hospitals, there appears to be adequate public service infrastructure in the Project study area to accommodate the temporary needs of the 276 non-local construction workers and the long-term needs of the 2 new permanent operations workers at Compressor Station 206. Additionally, it is anticipated that most non-local construction workers would not relocate their families temporarily during the construction period, and as such it is not anticipated that the Project would increase demand for school-related services. Due to the small number of permanent employees relative to the existing population, we conclude there would not be significant increased demand for school-related services resulting from non-local operations employees relocating to the Project area.

Prior to the Project being placed in service, Transco operations staff would meet with local emergency planning committees to review site-specific emergency response plans and Project mapping, including permanent access roads to Project facilities. Facility-specific training would be provided to local emergency personnel to inform them of response procedures at Project sites. Except for Compressor Station 206, the proposed Project consists of loops or expansions/modifications to existing facilities and, therefore, emergency responders near these Project components are familiar with the facilities and emergency response training associated with the facilities. Transco would work with emergency responders near Compressor Station 206 to develop and coordinate emergency response plans and training. Public safety and emergency response are discussed in more detail in section 4.11.

The USCG New York District, based on Staten Island, New York, would serve as the chief emergency responder to incidents during offshore construction of the Raritan Bay Loop. The USCG's Vessel Traffic Services (VTS) system manages vessel traffic movement in the waters of the Project area. The VTS system would provide active monitoring and navigational advice to Project vessels during construction. Each marine construction vessel would have specific emergency response/action plans according to type of vessel, cargo being stowed or carried, and quantity of fuel on board. The emergency response plans would comply with USCG requirements under 33 CFR 151. Additionally, Transco has developed an Emergency Preparedness and Response Plan for the Raritan Bay Loop that would be implemented if an emergency occurred that was outside the scope of the vessel-specific plans.

Construction of the Project would not significantly affect public services in the affected counties or communities due to the short duration of construction and the small influx of non-local workers during construction. The communities in the Project vicinity presently have and are expected to continue to have adequate infrastructure and services to meet the potential needs of non-local workers who enter the area temporarily. In the event of an accident, police, fire, and/or medical services could be necessary; however, the anticipated demand for these services is not expected to exceed existing capabilities in the Project study area.

As discussed in section 2.3.4, residents and local officials commented that the municipal water supply system near proposed Compressor Station 206 may be unable to provide adequate water to the compressor station in the event of a fire. Transco currently plans to connect to the municipal water supply system to obtain potable water for use during operation of the station and has indicated that Franklin Township is seeking permits from the New Jersey Department of Transportation to conduct repairs that would adequately serve customers along County Road 518, including Compressor Station 206. As discussed in section 4.3.1.7, Transco has stated that it would install a potable water tank(s) for temporary operational water use if the municipal repairs are not completed before Compressor Station 206 goes into service. Further, as discussed in section 4.11.4, in the event of a natural gas fire at the compressor station, Transco's automated emergency shutdown system would provide the most effective way to begin to address an emergency and Transco states that no fire hydrant would be necessary to address a fire at the site. As such, we conclude that the planned upgrades can reasonably provide the required municipal water service at Compressor Station 206.

4.8.5 Tourism

Tourism opportunities in the Project study area include federal, state, and local interest areas. Tourism opportunities include the Pennsylvania Dutch countryside, historic sites and museums, outdoor recreation opportunities, and water based recreational activities. Recreation and special interest areas are discussed in detail in section 4.7.5.

4.8.5.1 Onshore Tourism

Travel-related spending supports local economies near the proposed onshore Project facilities. Table 4.8.5-1 provides an overview of the economic impacts of travel-related spending in the counties crossed by the Project's onshore facilities.

TABLE 4.8.5-1

Economic Impact of Tourism in the Counties Crossed by the Onshore Northeast Supply Enhancement Project Facilities

State/County	Visitor Spending ($ million)	Tourism-Generated Employment	Tourism-Generated Labor Income ($ million)	State and Local Taxes ($ million)
PENNSYLVANIA [a]				
Lancaster	1,920.2	15,731	403.1	108.6
Chester	736.2	7,288	244.0	50.2
NEW JERSEY [b]				
Middlesex	2,329.8	22,792	N/A	307.9
Somerset	1,157.5	11,113	N/A	166.3

[a] Tourism Economics, 2014.
[b] Tourism Economics, 2015.

Visitor spending in Lancaster County, where the Quarryville Loop would be constructed, totaled $1.9 billion in 2014 and created 15,731 jobs in the county. Tourism-generated spending in Lancaster County provided over $108 million in state and local taxes in 2014. Primary attractions in Lancaster County include the Amish and Pennsylvania Dutch countryside, museums and historic sites, and outlet malls.

Visitor-related spending in Chester County, where existing Compressor Station 200 is located, totaled $736 million and created almost 7,288 jobs in the county in 2014. Tourism-generated spending provided over $50 million in state and local taxes in 2014. Visitor attractions in Chester County include historic sites and parks, museums, and amusement related activities.

In 2015, visitor-related spending in Somerset County, where Compressor Station 206 would be constructed, totaled approximately $1.2 billion and created 11,113 jobs. Travel-related spending provided approximately $166.3 million in state and local taxes in 2015. The Great Swamp National Wildlife Refuge and the Delaware and Raritan Canal State Park are the primary tourism attractions in Somerset County.

In 2015, visitor-related spending in Middlesex County, where the Madison Loop and onshore segment of the Raritan Bay Loop would be constructed, totaled over $2.3 billion and created 22,792 jobs. Travel-related spending provided approximately $308 million in state and local taxes during 2015. Onshore attractions in Middlesex County include hiking trails and canals, state parks, and historic sites.

The influx of approximately 276 non-local construction workers to the onshore Project study area would be limited to the time of construction. The demand for temporary housing by non-local workers is not expected to exceed the available number of rental units, hotels, motels, and campgrounds in the study area, but accommodations in the study area could experience some minor limited availability during peak tourism season.

As detailed in section 4.7.5.1, Transco has proposed general mitigation measures for recreation and special interest areas that would be affected by the Project (e.g., public notification protocols), and provided site-specific crossing plans completed in consultation with the applicable land management agency. Additionally, the Quarryville and Madison Loops would be collocated with Transco's existing Mainline pipeline for 100 percent of their length, thereby minimizing impacts on recreational areas in the study area.

Based on Transco's proposed measures to reduce impacts on recreational areas, thereby reducing impacts on the tourism industry in the onshore Project area, we conclude the Project would not result in significant or adverse impacts on recreational or special interest areas in the onshore Project study area. As such, and given the short timeframe for construction, we conclude the Project would result in minor, temporary impacts on tourism in the onshore Project area.

4.8.5.2 Offshore Tourism

Offshore tourism activities in waters within the Project area include recreational and sport fishing, boating, whale watching, scuba diving, and cruise ship operations. Offshore recreation and special interest areas are discussed in detail in section 4.7.5.2.

Recreational saltwater fishing occurs in both inland and ocean waters off the coast of New Jersey and New York. Offshore construction workspaces for the Raritan Bay Loop would cross recreational fishing areas including the Ambrose Channel Grounds, Tin Can Grounds, Gong Grounds, Between the Channels, and Scallop Ridge (see figure 4.5.2-1). The Raritan Bay Loop route itself (where the pipe would be laid) would cross the Ambrose Channel and Tin Can Grounds.

In 2015, over 4.2 million and 3.2 million saltwater recreational angler trips occurred in inland and ocean waters off the coasts of New Jersey and New York, respectively. The economic impacts of recreational saltwater fishing in the states of New Jersey and New York are presented in table 4.8.5-2.

TABLE 4.8.5-2

2015 Economic Impact of Recreational Saltwater Fishing in New Jersey and New York [a]

State	Number of Trips (2015)	Number of Trips (2012)	Expenditures ($ thousands)	Sales Impacts ($ thousands)	Value Added Impacts ($ thousands)	Income Impacts ($ thousands)	Employment Impacts (jobs)
New Jersey	4,287,444	5,020,042	1,529,853	1,888,249	1,114,003	710,667	13,131
New York	3,235,218	3,766,065	316,161	381,299	241,947	151,104	2,959

[a] NMFS, 2015c; 2012d.

In addition to recreational saltwater fishing, the waters located in the offshore Project area are used for other water-based recreational uses. The offshore Raritan Bay Loop would intersect areas of medium and high recreational boating use (chartered boats, motorized boating, kayaking, etc.) (SeaPlan, 2013; Northeast Ocean Data, 2017). Additionally, the offshore Raritan Bay Loop would cross waters used for commercial whale watching (Northeast Regional Planning Body, 2015), scuba diving sites (Northeast Regional Planning Body, 2015), and cruise line routes. Though specific data regarding the economic impacts of each of these recreational activities was not available, it is reasonably assumed these recreational activities, along with recreational saltwater fishing activities, support the local and state economies in the offshore portion of the Project area.

Transco would establish informal construction safety zones around segments of the offshore Raritan Bay Loop that are actively under construction. Water-based recreation (e.g., fishing, scuba diving, boating, whale watching) would be discouraged in these construction safety zones during active construction. To minimize impacts on recreational users of waters in the offshore Project area, Transco would provide notice of offshore construction activities and schedules to the USCG on a routine basis. This Local Notice to Mariners would include dates and locations of active construction to aid boaters in developing boating routes to avoid these areas and minimize disruption to itineraries. Additionally, Transco would work with the USCG Waterways Management Coordinator to ensure area cruise ports and cruise lines are updated on scheduled construction activities and active construction locations so that routes can be planned accordingly. All vessels and activities, including fishing and whale watching, would be discouraged from taking place within safety zones where active construction is underway. Transco would utilize HDD technology when installing the portion of the offshore pipeline route in the Ambrose Channel to reduce impacts on fishing and general water-based transit in that area.

Based on Transco’s proposed measures to reduce impacts on recreational uses in waters in the Project area, we conclude the Project would result in minor impacts on water-based recreation in the offshore Project study area including potential increases in travel time and the inability to traverse waters freely without restriction. As such, the offshore portion of the Project would have minor, temporary impacts on tourism during the duration of construction.

4.8.6 Commercial Fishing

As discussed in section 4.5.2.8, the waters of the New York Bight produce substantial quantities of commercially and recreationally important fish and shellfish. The New York Bight extends along the coasts of New Jersey and New York for approximately 250 miles, from Cape May in southern New Jersey to the eastern end of Long Island. The 23.2-mile-long offshore segment of the Raritan Bay Loop would occur in Raritan and Lower New York Bays, located centrally in the New York Bight. Approximately 4.5 million pounds of finfish and 4.2 million pounds of shellfish with values of $5.5 million and $4.2 million, respectively, were commercially landed within 3.0 miles of the entire New York shore in 2012 (NMFS, 2012e). Approximately 54.7 million pounds of finfish and 12 million pounds of shellfish with values of $5.4 million and $13.3 million, respectively, were commercially landed within 3.0 miles of the entire New Jersey shore in 2012 (NOAA, 2012). Table 4.8.6-1 summarizes the top five commercial fish landings, in terms of dollars, for nearshore New York and New Jersey waters in 2012.

TABLE 4.8.6-1

Top Five Commercial Fish Landings (Value) up to 3.0 Miles off New York and New Jersey Shoreline in 2012

State/Species	Pounds	Value ($)	Price per Pound ($)
NEW YORK			
Striped bass	684,000	1,689,000	2.47
Loligo squid	1,489,000	1,643,000	1.10
Summer flounder	359,000	1,059,000	2.95
American Lobster	236,000	856,000	3.63
Scup/Porgy	991,000	813,000	0.82
NEW JERSEY			
Atlantic blue crab	7,392,000	10,036,000	1.36
Menhaden	53,838,000	4,552,000	0.08
Clams or bivalves	2,209,000	1,572,000	0.71
Atlantic surfclam	2,265,000	1,359,000	0.60
Summer flounder	91,000	217,000	2.39

[a] NOAA, 2012.

Offshore construction activities could temporarily impact commercial and recreational fish species in Raritan and Lower New York Bays. Most of the impacts would be short-term, associated with increases in turbidity and sedimentation from construction activities such as trenching and dredging. Transco would establish informal construction safety zones around segments of the offshore Raritan Bay Loop that are actively under construction. Commercial fishing vessels would be discouraged in these construction safety zones during active construction. To minimize impacts on commercial fishers in the offshore Project area, Transco would provide a Local Notice to Mariners and/or direct notice to commercial fishing operators. The notice would include dates and locations of active construction to allow commercial fishing operators to either harvest or remove equipment from the areas soon to be under construction. Transco would coordinate timing of active construction with NYSDEC to ensure commercial fishing operators have the opportunity to harvest major bottom-gear fishery areas prior to construction commencing.

Once the pipeline is in operation there would be no fishing restrictions in the area and fishing activities may resume unrestricted.

Based on Transco’s proposed measures to reduce impacts on commercial fishing operations in the Project area, and as discussed in detail in section 4.5.2, we conclude the Project would result in minor impacts on commercial fishing in the offshore Project study area including potential restrictions to relatively small areas of prime commercial fishing grounds during active construction. As such, the offshore portion of the Project would have minor, temporary impacts on commercial fishing during the construction period.

4.8.7 Transportation and Traffic

4.8.7.1 Onshore Project Study Area

A network of interstate highways, state and county routes, and local roads traverse the Project study area and would provide access to pipeline and aboveground facilities and worksites. Freight and commuter rail lines are also located throughout the Project area. Roads and railroads that would be crossed by the Project, and Transco’s proposed crossing method for each crossing, are identified in table 4.7.1-7, and crossing methods are described in sections 2.3.2.1 (the HDD method) and 2.3.2.3 (the open cut and bore methods).

Four major two-lane highways convey traffic in the vicinity of the Quarryville Loop. The highways (U.S. Highway 222 and Routes 272, 472, Route 3009) run north-south perpendicular to the proposed pipeline route in Lancaster County. Route 372 provides east-west access and runs parallel to the Quarryville Loop connecting to all the north-south routes previously mentioned. Smaller arterial roads provide additional east-west access to the pipeline route. Norfolk Southern Railway moves freight through the Project area and is located west of the proposed Quarryville Loop, but is not crossed by the Project.

In Chester County, Interstate 76 and Route 401 convey east-west traffic in the vicinity of Compressor Station 200. North Bacton Hill Road provides north-south conveyance and access to smaller collector and access roads leading to Compressor Station 200. Amtrak and Southeastern Pennsylvania Transportation Authority operate commuter rail lines approximately 1.5 miles from Compressor Station 200. Project workers and equipment would be conveyed along the roads near Compressor Station 200, but none of the roads or railroads in the area would be crossed by Project facilities.

Two major north-south highways, U.S. Highway 9 and the Garden State Parkway, would be crossed by the Madison Loop in Middlesex County. Route 35 and County Route 615 border the eastern and western termini of the Madison Loop, respectively. A number of freight and passenger rail lines pass within 0.5 mile of the Madison Loop, but none would be crossed by the pipeline route.

The Raritan Bay Loop would be installed beneath the six-lane Route 35 which conveys north-south traffic in the Project study area. Route 35, in conjunction with smaller local roads, provides access to the onshore portion of the Raritan Bay Loop. The Raritan Bay Loop would also be installed beneath the North Jersey Coast Line passenger rail line, which provides north-south conveyance of passengers.

State, county, and local roads would facilitate access to Compressor Stations 200 and 206. Transco would construct a new permanent access road to Compressor Station 206 from the County Road 518.

Table 4.8.7-1 provides a summary of the Annual Average Daily Traffic (AADT) counts on the major roads providing access to project facilities.

Construction of the onshore components of the Project would require a maximum workforce of 294 workers for the Quarryville Loop; 162 workers for the Madison Loop; 77 workers at Compressor Station 200; and 88 workers at Compressor Station 206. Transco expects the majority of the workforce to be on site starting at 7:00 am and departing around 7:00 pm, which would limit some impacts to local commuting traffic in the Project study area. Transco would use shuttle buses if necessary to transport workers from designated parking areas to construction work areas. Where buses are not practicable, workers would be encouraged to carpool to reduce potential effects on commuter traffic.

TABLE 4.8.7-1

Primary Transportation Routes and Annual Daily Traffic Counts for the Northeast Supply Enhancement Project

Facility/State	Travel Route Utilized for Ingress/Egress to Construction Right-of-way or Project Access Road [a]	Annual Average Daily Traffic [b, c]
Pipeline Facilities		
Pennsylvania		
Quarryville Loop		
	River Road	100
	Susquehannock Drive [d]	500 [e]
	Lancaster Pike (PA Rt 272)	10,000
	Scotland Road (State Route 3010 – eastbound/westbound)	1,300
	Scotland Road (State Route 3010 – northbound/southbound)	1,300
	Robert Fulton Highway (US Rt 222)	4,600
	Kirkwood Pike (PA Rt 472)	5,300
New Jersey		
Madison Loop		
	US Hwy 9 (southbound)	45,604
	US Hwy 9 (northbound)	36,341
	Ernston Road (NJ Rt 673)	18,592
Raritan Bay Loop (onshore portion)	Route 35	28,963 [f]
Aboveground Facilities		
Pennsylvania		
Compressor Station 200	PA 401	13,000
	W. Swedesford Rd	4,300
New Jersey		
Compressor Station 206	County Road 518	6,734

a Includes roads that have AADTs calculated only.
b Source: Pennsylvania Department of Transportation, 2016.
c Source: New Jersey Department of Transportation, 2017.
d Susquehannock Drive is a local road near the Quarryville Loop and eventually becomes State Route 3009.
e AADT for Susquehannock Drive measured on portion of road that is State Route 3009.
f Source: New Jersey Department of Transportation, 2014.

Table 4.8.7-2 provides estimates for construction related traffic in the vicinity of Project facilities.

Many of the roads used for ingress and egress to the construction right-of-way or Project access roads are narrow, two-lane roads. Construction of the Project could affect transportation and traffic across and within roadways due to increased vehicle traffic associated with commuting of the construction workforce as well as movement of heavy trucks and delivery of equipment and materials. In particular, River Road in the vicinity of the Quarryville Loop and Old Water Works Road in the vicinity of the Madison Loop would see large increases in current traffic volumes compared to current AADTs. In the instance of River Road, construction vehicle traffic would triple the current AADT on the two-lane road.

TABLE 4.8.7-2

Land Transportation Associated with Construction of the Northeast Supply Enhancement Project

Facility/State	Maximum Daily Trips (Construction Workforce)	Total Heavy Truck Delivery Trips [a]	Total Heavy Equipment Transport Trips
Pipeline Facilities			
Pennsylvania			
Quarryville Loop	418 [b]	270	176
New Jersey			
Madison Loop	272 [c]	180	148
Aboveground Facilities			
Pennsylvania			
Compressor Station 200	100	370	52
New Jersey			
Compressor Station 206	176	830	68

a Seventy percent of heavy truck trips associated with construction of the Quarryville and Madison Loops would occur in the first month of construction. The majority of heavy truck trips would occur outside of peak commuting hours.

b Sum of 234 trips by carpooling crew laborers and 184 trips by company employees and contractors driving single-occupied light trucks.

c Sum of 100 trips by carpooling crew laborers and 172 trips by company employees and contractors driving single-occupied light trucks.

Construction activities in the Project study area would result in temporary effects on local transportation infrastructure and vehicle traffic, including disruptions from increased transportation of construction equipment, materials, and workforce; disruptions from construction of pipeline facilities at or across existing roads; and damage to local roads and road infrastructure caused by heavy machinery and materials and increased sediment tracking/build-up and surface damage.

During construction, construction vehicles would access the right-of-way primarily at public road crossings; however, in certain areas permanent and temporary access roads would be constructed to provide access. Traffic-control measures would be implemented along roads to ensure safe ingress and egress of construction vehicles onto roadways from the right-of-way. Transco would utilize equipment tracking mats or other similar measures to minimize the amount of soil tracked from the right-of-way onto roadways. Upon completion of construction activities, Transco would repair any construction related road damage bringing roadways to preconstruction condition.

4.8.7.2 Construction Across and Within Roadways and Railroads

The Project would require the crossing of 18 roadways in Pennsylvania, 11 roadways in New Jersey, and 1 commuter railroad in New Jersey. The roadways crossed range from maintained local paved roads to state highways. A detailed list of road and railroad crossings and proposed crossing methods are provided in table 4.7.1-7. Roads would be crossed by the open-cut, conventional bore, or HDD methods as described in sections 2.3.2.1 and 2.3.2.2. The use of conventional bore and HDD methods would be used to cross beneath 17 roads and the commuter rail line, thereby avoiding direct surface impacts to the transportation facilities.

The open-cut crossing method would be used at 12 public and private roads. During open-trench crossings, Transco would ensure provisions are made for detours or other traffic control measures to allow for traffic flow to continue during construction. One lane would be left open for the majority of the process, except for the short period when the pipe is lowered into the trench. Transco would ensure that construction activities do not impede safe passage of emergency vehicles or school buses and where appropriate horse-drawn vehicles and other non-motorized vehicles.

Transco has committed to provide a Traffic and Transportation Management Plan prior to construction if the Project is approved. The Traffic and Transportation Management Plan would detail specific procedures for avoiding or mitigating traffic related impacts during Project construction.

We find that the mitigation measures listed above would adequately reduce impacts on traffic flow, and result in minor and temporary impacts on most roadways and traffic in the Project area during construction. Construction traffic on River Road in Lancaster County would be greater but limited to the period of construction near that segment of the Quarryville Loop.

4.8.7.3 Offshore Project Study Area

The offshore portion of the Raritan Bay Loop would traverse Raritan Bay and Lower New York Bay. Lower and Upper New York Bays are heavily utilized by commercial vessels moving in and out of the Port of New York and various terminals in New Jersey out to the Atlantic Ocean. Commercial vessels regularly traversing Lower and Upper New York Bays and Raritan Bay include cargo, tanker, tug and towing vessels; commercial and recreational fishing vessels; and passenger vessels such as cruise ships, ferries, and ocean liners. The heaviest vessel traffic in the waters located in the Project area are found in Lower New York Bay in the Ambrose Channel, Chapel Hill Channel, and an unnamed channel located adjacent and to the west of the Chapel Hill Channel. The highest concentration of vessel traffic through Raritan Bay occurs in the Raritan Bay Channel (BOEM and NOAA, 2016).

A high density of commercial fishing vessels travel through the Ambrose Channel from the Upper New York Bay to the Atlantic Ocean to fishing locations mainly within up to 12 nautical miles from shore. Additionally, fishing vessels also originate from the Upper New York Bay and remain within state waters of New York and New Jersey (up to 3 miles offshore). Raritan Bay experiences less commercial fishing vessel traffic compared to the New York Bay.

Marine construction and support vessels would originate from two existing marine support facilities in New Jersey and traverse either south along the Arthur Kill to the Raritan Bay Channel (Route 1), or east along Kill Van Kull to Upper New York Bay and then south to Lower New York Bay where vessels would utilize either the Ambrose Chanel (Route 2) or the Chapel Hill Channel (Route 3) (see figure 2.3.3-1). In 2013, annual vessel passages[30] in each of the three marine routes considered for access to the offshore Raritan Bay Loop were as follows:

- Route 1 – 7,681 total passages;
- Route 2 – 24,949 total passages; and
- Route 3 – 24,837 total passages (Department of Commerce, 2013).

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30 The following vessel types are required to use the Automatic Information Systems (AIS) to report vessel position information (33 CFR 164, Section 46):

- Self-propelled vessels 65 feet or longer engaged in commercial activities;
- Towing vessels 26 feet or longer and with a horsepower of 600 or more, engaged in commercial activities;
- Self-propelled passenger vessels;
- Self-propelled vessels carrying dangerous cargo or flammable or combustible bulk cargo; and
- Fishing industry vessels.

As detailed in section 2.3.3.1, construction of the Raritan Bay Loop would require the use of various vessels throughout the 9-month construction period. Construction and support vessels would be deployed to various locations along the pipeline route depending on where construction activities are occurring. Transco estimates that an average of 20 vessels per day would be used during the early part of construction (pipelay, HDD). Once construction moves to the pipe burial phase, the number of vessels used per day would be reduced to approximately 10. Based on the pipelay, HDD, and pipe burial schedules, approximately 5,400 vessel passages would occur during construction along the three routes.

During construction, Transco would use 24-hour picket boats and tug boats along active workspaces to discourage non-Project vessels from entering active construction work areas and to redirect non-project vessels around active work areas. Transco would use the HDD method to install pipe below the Ambrose Channel to minimize disruption to the main route through to the Port of New York. Open-cut methods would be used to install the pipeline across the Raritan Bay and Chapel Hill Channels. Transco would coordinate with the USCG Waterways Management Coordinator when scheduling construction across these routes. Once construction has been scheduled, a local Notice to Mariners would be published to inform vessels of any movement restrictions. We find that the measures listed above would adequately reduce impacts on marine traffic flow across the Project work area, and based on these mitigation measures, impacts on marine traffic in the offshore Project area during construction would be minor and temporary.

4.8.8 Property Values and Insurance

We received comments regarding the potential adverse effects of the Project on property values and home insurance, particularly near Compressor Station 206. FERC staff identified two recent studies that assessed the effects of natural gas pipeline compressor stations on property values. The first study was prepared for the National Fuel Gas Supply Corporation and assesses the impacts on property values in neighborhoods surrounding compressor stations in seven locations in New York. Sales data over the previous 15 years was evaluated and assessors from six of the seven areas were interviewed. The study found no quantifiable evidence of a discernable effect on property values or appreciation rates of properties within 0.5 mile of compressor stations. The study, which notes the general lack of sales data for analysis, identified the following commonalities among the seven areas: the compressor stations were sited on large land parcels and set back from the road; natural and constructed buffers were utilized; and compressor station sites were generally in rural areas removed from higher density development (Griebner, 2015).

The second study, “A Study of Natural Gas Compressor Stations and Residential Property Values,” prepared for Tennessee Pipeline Company LLC, was based on four case studies in New Hampshire and Massachusetts, compared the value of properties close to compressor stations to properties located farther away. The study relied on available market data and interviews with town assessors, building department representatives, and other government representatives. The study concluded that the presence of a compressor station did not generally affect property values in the area. The study indicated a higher confidence in this conclusion for properties more than 0.5 mile from compressor stations. The reason for this is that the areas surrounding the compressor stations in each of the case studies were more rural in nature and therefore there was a comparative lack of sales data in the immediate vicinity of the compressor stations as compared to the area 0.5 mile away. Overall, the study concluded that “well designed and operated compressor stations located on larger sites with adequate buffers should have minimal impact on surround land uses and residential property values” (Foster, 2016).

The FERC staff conducted independent research and found multiple studies that examined the effects of pipeline easements on sales and property values, and evaluated the impact of natural gas pipelines on real estate. One such study examined the affect a pipeline accident had on nearby property values. The study analyzed the impact that a June 1999 Bellingham, Washington gasoline pipeline explosion had on sales of real estate on or near the pipeline after the accident. The study, which considered proximity and persistence over time, found that prior to the accident there was no significant effect on property values due to proximity of the pipeline. However, immediately after the accident the study found that houses adjacent to the pipeline sold for $13,000 less than houses further away. However, over time the discount reduced back to pre-incident levels (Hansen et al., 2006).

Other studies analyzed by the FERC staff examined the impact the presence of a natural gas pipeline had on residential property values where no accidents had occurred. In 2001, the Interstate Natural Gas Association of America (INGAA) sponsored a national study to determine if the presence of a pipeline affected property values or sales prices. The study employed paired sales, descriptive statistics, and linear regression analysis to assess impacts on four separate, geographically diverse case study areas. The study found that having a pipeline on the property did not significantly alter sales prices. The size of the pipeline (diameter) had no significant impact on home prices. The study concluded that the presence of a pipeline did not impede the development of surrounding properties (Allen, Williford and Seale, Inc., 2001).

Studies conducted in 2008 by PGP Valuation Inc. (PGP) (PGP, 2008) for Palomar Gas Transmission, Inc. and by Ecowest for the Oregon LNG Project reached similar conclusions. Both studies evaluated the potential effect on property values of a natural gas pipeline that was constructed in 2003/2004 in northwestern Oregon, including along the western edge of the Portland metro area. The PGP study found that:

- there was no measurable long-term impact on property values resulting from natural gas pipelines for the particular pipeline project studied;
- interviews with buyers and brokers indicated no measurable impact on value or price; and
- there was no trend in the data to suggest an extension of marketing periods (i.e., time while the property is on sale) for properties with natural gas pipeline easements.

The Ecowest study concluded that the pipeline had no statistically significant or economically significant impact on residential properties. The study also concluded that there was no relationship between proximity to the pipeline and sale price (Fruits, 2008).

One study, *"The Effect of Pipelines on Residential Value"* (Diskin et al., 2011), looked at the effects of natural gas transmission pipelines on residential values in Arizona. The study concluded that there was no identifiable systemic relationship between proximity to a pipeline and residential sale price or value.

Another study, *"Pipeline Impact Study: Study of a Williams Natural Gas Pipeline on Residential Real Estate: Saddle Ridge Subdivision, Dallas Township, Luzerne County, Pennsylvania"* prepared by the firm of Allen, Williford and Seale, Inc., assessed the impact on the sale price of undeveloped lots and single-family residences that have a natural gas transmission line easement on the property (Allen, Williford and Seale, Inc., 2014). The report compared units in the Saddle Ridge subdivision in Luzerne County that had an existing natural gas transmission line located within it. Differences between the sale prices of undeveloped lots and houses with the pipeline easement and those that did not have an easement were analyzed. The report found that, when the sales prices of the encumbered residences were compared with the sales prices of the unencumbered residences, there was no indication that the pipeline easement had any effect on the sale prices of homes in Saddle Ridge. Likewise, when the sales prices of encumbered lots were compared with the sales prices of unencumbered lots, the differential in price could be explained by the reduction in lot size associated with the easement area.

For our analysis of the Constitution Pipeline and Wright Interconnect Projects (Docket Nos. CP13-499-000 and CP13-502-000), in Pennsylvania and New York, several appraisers were contacted about the potential impacts on property values due to the presence of a natural gas pipeline (FERC, 2014). One appraiser who teaches seminars for appraisers and realtors, including discussions of mineral rights and pipeline easements, provided information on the subject. According to the appraiser, "the empirical evidence indicates no difference in value attributable to the existence of the pipeline easement." The appraiser further noted that he was not aware of appraisers making adjustments in the appraiser reports for the existence of a pipeline easement. He stated that the large number of variables that impact home values make it difficult to determine the incremental effect that any one variable may have on a home's value. Regardless, it is possible that the perceived safety issues or the limitations on land use within the permanent easement could reduce the number of potential buyers for a property, which may extend the number of days a property is on the market.

In 2016, INGAA released a study conducted by Integra Reality Resources (IRR) that analyzed the impacts on property values from a number of FERC-jurisdictional natural gas transmission pipelines throughout the country. Case studies were analyzed from Ohio, Virginia, New Jersey, Pennsylvania, and Mississippi. The investigation focused on single-family homes and townhomes, and looked at sales prices over a number of years. In all case studies, sale prices were adjusted for square footage, and a linear regression model was run to determine correlations between home prices and proximity to pipeline easements. IRR found there were no statistically significant differences between prices paid within the same subdivision for houses located adjacent to a pipeline easement and houses farther away (IRR, 2016).

We recognize that the studies cited above do not necessarily have a one to one applicability to all areas affected by Project, but note that most of studies that analyze the effects of natural gas transmission pipelines on sales and property values were conducted in areas with high residential density similar to that found in the Project areas in New Jersey. The studies pertaining to the effects of compressor stations on property values considered more rural sites than the proposed location for Compressor Station 206, although the nearest residence to the proposed compressor building is about 0.5 mile away; the facility would be screened from view by surrounding mature forest; and the facility would meet our noise requirements at NSAs.

We acknowledge that it is reasonable to expect that property values may be impacted differently based on the setting and inherent characteristics of each property. Based on the research we have reviewed, however, we find no conclusive evidence indicating that natural gas pipeline easements or compressor stations would have a significant negative impact on property values, although this is not to say that any one property may or may not experience an impact on property value for either the short or long term.

Regarding the potential for insurance premium adjustments associated with pipeline proximity, insurance advisors consulted on other natural gas projects reviewed by the FERC indicated that pipeline infrastructure does not affect homeowner insurance rates (FERC, 2008). As such, we find that homeowners' insurance rates are unlikely to change due to construction and operation of the proposed Project. Similarly, regarding the potential impacts on mortgage rates associated with pipeline proximity, our research has not found any practice by mortgage companies to re-categorize properties, nor are we aware of federally insured mortgages being revoked based on proximity to pipelines.

4.8.9 Economy and Tax Revenues

An economic analysis commissioned by Transco was completed by Rutgers University in June 2017. The scope of the analysis assessed the economic impact of the Project in Pennsylvania, New Jersey, and New York and the counties where the Project facilities would be located. We received a comment purporting that the Rutgers study over-estimated the total jobs created during construction due to an overestimation of total jobs required for construction. We acknowledge the discrepancy between the Rutgers analysis and the workforce data used in section 4.8.3. The information analyzed in the Rutgers study represents a high-level summary of economic benefits based on initial Project workforce need projections. As the Project design progressed, Transco updated its workforce need and these employment numbers are included in section 4.8.3.

Construction of the Project would have a beneficial, short-term impact on employment, local goods and service providers, and state and local governments in the form of sales tax revenue. Table 4.8.9-1 identifies the economic effects that construction of the Project would have on the Project study area and the greater Pennsylvania, New Jersey, and New York tri-state area.

Project construction would support an estimated 3,186 direct and indirect job-years in the tri-state area. Of these, 936 job-years would be realized within the Project study area. The Project would generate approximately $234.1 million in direct and indirect labor compensation in the tri-state area, of which $85.8 million would be generated in the Project study area.

Table 4.8.9-2 identifies the estimated in-state and total construction payroll and material and equipment expenditures expected to take place during Project construction. Transco estimates that 60 percent of construction payroll would be paid to workers living within the tri-state area and that 69 percent of spending on construction related materials and equipment would take place within the tri-state area.

As outlined in table 4.8.9-3, Project construction expenditures could generate approximately $12.5 million in state and $10.2 million in local tax revenues in the Project study area. State and local tax revenues would be generated both within the counties crossed by the Project, as well as statewide (i.e., in other counties and municipalities within the state).

Additionally, local communities in the Project area would benefit from annual property taxes and submerged land easement fees that would be paid by Transco over the life of the Project. Table 4.8.9-4 provides the estimated annual property taxes and submerged land easement fees for Project facilities.

We received comments concerned that Compressor Station 206 would negatively impact local businesses and reputation. The nearest places of business to the proposed compressor building are about 0.5 mile to the east, along Route 27, and the majority of the intervening area is forested. Thus, the facility would be screened from view by mature forest, and would meet our noise requirements at NSAs. Therefore, we conclude that the overall economic effects resulting from the Project would be beneficial at the state, local, and county levels in the form of increased sales and payroll taxes. In the short-term, the Project would create economic stimulus to the affected areas via payroll and materials expenditures and sales taxes. Transco would purchase goods, materials, and services locally when possible. Workers would also most likely spend a portion of their pay in local communities on items such as housing, food, automobile expenses, and entertainment.

TABLE 4.8.9-1

Economic Effects of Construction of the Northeast Supply Enhancement Project

	Employment (job-years) [a]			Gross Domestic Product ($ millions)			Compensation ($ millions) [b]		
Facility/Location	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Quarryville Loop									
Lancaster County (Study Area)	125	104	229	20.6	7.1	27.7	14.7	6.6	21.3
Pennsylvania	125	197	322	20.6	20.1	40.7	14.7	14.4	29.1
Compressor Station 200									
Chester County (Study Area)	74	43	117	9.8	5.3	15.1	8.1	3.5	11.6
Pennsylvania	74	104	177	9.8	13.1	22.9	8.1	8.4	16.5
Study Area Subtotal	199	147	346	30.4	12.4	42.8	22.8	10.1	32.9
Pennsylvania Subtotal	199	301	499	30.4	33.2	63.6	22.8	22.8	45.6
Madison Loop									
Middlesex County (Study Area)	113	105	218	20.6	7.4	28.0	14.4	6.1	20.5
New Jersey	113	210	323	20.6	18.6	39.2	14.4	12.1	26.5
Compressor Station 206									
Somerset County (Study Area)	107	59	166	13.1	3.6	16.7	9.2	3.2	12.4
New Jersey	107	152	259	13.1	11.7	24.8	9.2	8.5	17.7
Raritan Bay Loop (New Jersey)									
Middlesex County (Study Area)	106	100	206	19.8	6.9	26.7	14.2	5.8	20.0
New Jersey	764	1,065	1,829	89.2	86.7	175.9	69.5	58.2	127.7
Study Area Subtotal	326	264	590	53.5	17.9	71.4	37.8	15.1	52.9
New Jersey Subtotal	984	1,427	2,411	122.9	117	239.9	93.1	78.8	171.9
Raritan Bay Loop (New York)									
New York Subtotal	115	161	276	11.3	12.4	23.7	8.3	8.3	16.6
Study Area Total	525	411	936	83.9	30.3	114.2	60.9	25.2	85.8
Tri-State Area Total	1,298	1,889	3,186	164.6	162.6	327.2	124.2	109.9	234.1

[a] A job-year represents one worker employed for 1 year.

[b] Compensation represents total wages, salaries, and wage supplements (e.g., employer contributions to government and private pensions).

Source: Rutgers, 2017.

TABLE 4.8.9-2

Estimated In-State and Total Construction Payroll and Expenditures for Materials and Equipment [a]

State/Facility	Construction Payroll ($ millions) In-State	Construction Payroll ($ millions) Total	Material and Equipment Expenditures ($ millions) In-State	Material and Equipment Expenditures ($ millions) Total
PENNSYLVANIA				
Quarryville Loop	16.0	26.7	11.7	17.0
Compressor Station 200	7.8	13.0	5.7	8.3
Pennsylvania Subtotal	23.8	39.7	17.4	25.3
NEW JERSEY				
Madison Loop	14.3	23.8	10.4	15.2
Compressor Station 206	9.0	14.9	6.5	9.5
Raritan Bay Loop	69.4	115.7	52.1	76.0
New Jersey Subtotal	92.7	154.4	69.0	100.7
NEW YORK				
Raritan Bay Loop	12.2	20.4	7.3	10.7
New York Subtotal	12.2	20.4	7.3	10.7
Total	128.7	214.5	93.7	136.7

[a] Values rounded to nearest $100,000

[b] Includes labor, fringes, insurance, and payroll taxes for construction workers.

Source: Rutgers, 2017.

TABLE 4.8.9-3

Estimated Taxes and Permit Fees During Construction of the Northeast Supply Enhancement Project

State/County	Taxes [a] State Tax Receipts ($ thousands)	Taxes [a] Local Tax Receipts ($ thousands)	Environmental and Other Permit Fees ($ thousands)
PENNSYLVANIA			
Lancaster	602.1	960.3	128.3 [b]
Chester	310.3	495.8	216.8 [b]
Other Counties	570.4	979.4	-
Pennsylvania Subtotal	1,482.8	2,435.5	345.1
NEW JERSEY			
Middlesex [c]	2,009.3	1,385.7	100.0 [b]
Somerset	602.6	418.3	175.0 [b]
Other Counties	7,282.5	4,734.8	-
New Jersey Subtotal	9,894.4	6,538.8	275.0
NEW YORK			
Statewide Subtotal	1,100.0	1,200.0	10.0
Total	12,477.2	10,174.3	630.1

[a] State and local tax receipts reported at the state level include state and local taxes collected in the Project area counties as well as those collected in other jurisdictions within the state.

[b] Includes environmental and other permit fee payments to the county/local municipalities and the state.

[c] Tax receipts and permit fees in Middlesex County include the sum of taxes and fees generated by the Madison Loop and Raritan Bay Loop.

Source: Rutgers, 2017.

TABLE 4.8.9-4

Annual Property Taxes and Submerged Land Easement Fees for Northeast Supply Enhancement Project Facilities [a]

State/County/Locality	Property Tax Receipts/Submerged Land Easement Fees ($ thousands)
NEW JERSEY	
Middlesex County	
Old Bridge Township	775.0
Sayreville Borough	225.0
Somerset County	
Franklin Township	25.0
New Jersey State Waters	275.0
New Jersey Subtotal	1,300
NEW YORK	
New York State Waters	9,800
New York Subtotal	9,800
Total	11,100

[a] In Pennsylvania, the underground portions of natural gas transmission pipelines are exempt from Public Utility Realty Tax and the Realty Transfer Tax. However, local taxing entities may tax aboveground facilities.

Source: Rutgers, 2017.

Overall, the Project would result in beneficial economic effects on the state and local economies by creating a short-term stimulus to the affected areas through payroll expenditures, local purchases of consumables and project-specific materials, and sales tax. Furthermore, operation of the Project would result in long-term property tax and submerged land easement fee benefits in the counties and localities in New Jersey and New York in the Project area.

4.8.10 Environmental Justice

EO 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to consider if impacts on human health or the environment (including social and economic aspects) would be disproportionately high and adverse for minority and low-income populations and appreciably exceed impacts on the general population or other comparison group.

Consistent with EO 12898, the CEQ called on federal agencies to actively scrutinize the following issues with respect to environmental justice (CEQ, 1997):

- the racial and economic composition of affected communities;
- health-related issues that may amplify project effects on minority or low-income individuals; and
- public participation strategies, including community or tribal participation in the process.

The EPA's Environmental Justice Policies focus on enhancing opportunities for residents to participate in decision making. The EPA (2011) states that Environmental Justice involves meaningful involvement so that: "(1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contributions can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected."

In accordance with EO 12898, all public documents, notices, and meetings for the NESE Project were made readily available to the public during our review of the Project. Transco met with many different stakeholders during the initial development of the route, including local residents and affected landowners. These efforts involved open houses within the affected communities and meetings with local authorities. Transco also established, and is maintaining, a website to share Project information with the public.

Transco also used the FERC's Pre-filing Process (see section 1.3). One of the major goals of this process is to increase public awareness and encourage public input regarding every aspect of the Project (e.g., design, routing, environmental concerns and impacts) before an application is filed. As part of this process, FERC staff participated in Transco's open houses and hosted public scoping sessions to receive input from any stakeholders about the Project. Interested parties have had, and will continue to be given, opportunities to participate in the NEPA review process. To date, this included the opportunity to participate in the scoping process to identify concerns and issues that should be covered in the EIS, and the opportunity to submit written comments about the Project to the FERC. Stakeholders also had the opportunity to review and comment on the draft EIS either in writing or in person at the public comment sessions identified at the beginning of the document.

4.8.10.1 Demographic and Economic Data

Based on published EPA guidance concerning environmental justice reviews (EPA, 1998), we used a three-step approach to conduct our review. These steps are:

1. Determine the existence of minority and low-income populations.
2. Determine if resource impacts are high and adverse.
3. Determine if the impacts fall disproportionately on environmental justice populations.

For the purposes of this review, a low-income population exists when the percentage of all persons living below the poverty level is greater than the percentage for the state where the census tract is located.

Also, for the purpose of this review, minority population exists when:

1. the total racial minorities in a U.S. Census Bureau-defined census tract (U.S. Census Bureau, 2016) are more than 50 percent of the tract's population;

2. the percentage of a racial minority in a census tract is "meaningfully greater"[31] than in the comparison group;

3. the total ethnic minorities in a census tract are more than 50 percent of the tract's population; or

4. the percentage of ethnic minorities in a census tract is meaningfully greater than in the comparison group.

Racial and ethnic minorities include: African American/Black, Native American or Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, two or more races, and other races; and the Hispanic or Latino ethnicity.

[31] "Meaningfully greater" is defined in this analysis when minority or ethnic populations are at least 10 percentage points more than in the comparison group, which is the county in which the census tract is located.

Table 4.8.10-1 provides an overview of the racial and economic characteristics of the population within the 22 unique census tracts within a 1-mile radius of all Project facilities.

In Pennsylvania, 13.5 percent of the population lives below the poverty level. In one of the six census tracts within 1 mile of the Quarryville Loop (CT 145.02), 15.6 percent of the population is below the state-wide population below the poverty level. The percentages of the population within the other five census tracts within 1 mile of the Quarryville Loop and the two census tracts within 1 mile of Compressor Station 200 do not exceed the state-wide population below the poverty level.

In Pennsylvania, minorities comprise 26.4 percent of the total population. The percentage of minorities in the five census tracts within 1 mile of the Quarryville Loop ranges from 0.3 to 3.8 percent, none of which are greater than the minority population of Lancaster County (11.4 percent). The percentage of minorities in the three census tracts within 1 mile of Compressor Station 200 ranges from 17.8 to 22.2 percent, none of which are meaningfully greater than the minority population of Chester County (13.6 percent).

In New Jersey, 10.8 percent of the population lives below the poverty level. The percentage of the population below the state poverty level in the 12 census tracts within 1 mile of the Madison Loop ranges from 1.6 to 10.6 percent, and the percentages of the population below the state poverty level within the 2 census tracts within 1 mile of the Madison Loop are 1.7 and 8.0 percent. Thus, none of the census tracts within 1 mile of the onshore Project facilities in New Jersey include populations that exceed the percentage of the state-wide population living below the poverty level.

In New Jersey, minorities comprise 31.7 percent of the total population. The percentage of minorities in the two census tracts within 1 mile of Compressor Station 206 are 55.8 and 62.6 percent, both of which are meaningfully greater than the minority population of Middlesex and Somerset Counties (39 and 31.8 percent, respectively). The minority population (55.8 percent) in census tract 84.03 is comprised primarily of persons identifying their race as either Asian or African American (41.3 and 11.9 percent respectively). Of the percentage of the population that identifies as Asian, 29.1 percent identified as Asian Indian. The minority population (62.6 percent) in census tract 534.02 is comprised primarily of persons identifying their race as either Asian or African American (38.1 and 15.8 percent respectively). Of the percentage of the population that identifies as Asian, 26.7 percent identified as Asian Indian.

The percentage of minorities in the census tracts within 1 mile of the Madison Loop ranges from 7.9 to 64.4 percent. Two census tracts within 1 mile of the Madison Loop have a minority population greater than the minority population of Middlesex County (39.0 percent). The minority population (64.4 percent) in census tract 71.03 is comprised primarily of persons identifying their race as either African American or Asian (43.3 and 17.3 percent respectively). Of the percentage of the population that identifies as Asian, 11.8 percent identified as Asian Indian. The minority population (58.6 percent) in census tract 79.08 is comprised primarily of persons identifying their race as either Asian or African American (35.1 and 17.5 percent respectively). Of the percentage of the population that identifies as Asian, 21.3 percent identified as Asian Indian.

TABLE 4.8.10-1

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 mile of the Northeast Supply Enhancement Project

Facility/Location	Total population [a]	White (%) [a, b]	Black or African American (%) [a]	American Indian and Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian and Other Pacific Islander (%) [a]	Some other race (%) [a]	Two or more races (%) [a]	Hispanic or Latino origin (of any race) (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [a]
United States	316,515,021	73.6	12.6	0.8	5.1	0.2	4.7	3.0	17.1	26.4	15.5
Pipeline Facilities											
Pennsylvania	12,779,559	81.6	1.0	0.2	3.1	0.0	2.0	2.1	6.4	18.4	13.5
Quarryville Loop											
Lancaster County	530,216	88.6	4.0	0.1	2.0	0.0	3.2	2.0	9.6	11.4	10.7
CT 144.02	4,734	96.2	0.9	0.0	0.4	0.0	0.8	1.7	5.5	3.8	11.0
CT 145.01	5,209	99.4	0.0	0.0	0.0	0.0	0.3	0.3	2.9	0.6	7.6
CT 145.02	5,729	99.7	0.0	0.0	0.1	0.0	0.0	0.2	2.4	0.3	15.6
CT 146.01	3,839	98.7	1.3	0.0	0.0	0.0	0.0	0.0	4.0	1.3	5.6
CT 146.02	7,905	99.4	0.3	0.0	0.0	0.0	0.1	0.3	1.0	0.6	4.7
New Jersey	8,904,413	68.3	13.5	0.2	9.0	0.0	6.4	2.5	19.0	31.7	10.8
Madison and Onshore Raritan Bay Loops											
Middlesex County	830,300	61.0	9.8	0.2	23.2	0.0	3.4	2.2	19.6	39.0	8.8
CT 71.03	5,031	35.6	43.3	0.0	17.3	0.0	2.4	1.4	12.1	64.4	10.6
CT 73.01	3,003	91.8	4.5	0.0	2.7	0.0	1.0	0.0	12.5	8.2	2.6
CT 73.03	1,769	85.6	7.8	0.0	3.5	0.0	0.0	3.1	13.0	14.4	4.8
CT 73.04	6,762	51.2	16.4	0.2	28.3	0.0	1.4	2.5	12.1	48.8	5.8
CT 74.02	4,654	80.0	8.4	0.0	7.9	0.2	0.0	3.5	11.9	20.0	6.2
CT 76.00	5,530	92.1	3.5	0.0	2.7	0.0	0.3	1.5	14.1	7.9	7.9
CT 78.01	3,211	68.3	12.7	0.0	17.0	0.0	1.4	0.7	9.1	31.7	3.3
CT 79.05	2,248	78.2	4.6	0.0	10.9	0.0	5.1	1.1	13.2	21.8	2.3
CT 79.07	3,007	84.8	2.8	0.0	11.8	0.0	0.0	0.6	13.0	15.2	1.6
CT 79.08	4,442	41.4	17.5	0.0	35.1	0.0	3.4	2.6	24.8	58.6	6.7
CT 79.10	3,431	77.3	2.7	0.5	12.3	0.2	1.3	5.7	9.9	22.7	5.3
CT 80.01	7,232	81.1	7.7	0.0	8.0	0.0	1.1	2.0	12.1	18.9	3.9
Aboveground Facilities											
Pennsylvania	12,779,559	81.6	1.0	0.2	3.1	0.0	2.0	2.1	6.4	18.4	13.5
Compressor Station 200											
Chester County	509,797	86.4	5.9	0.1	4.5	0.0	1.1	2.0	7.0	13.6	7.1
CT 3020.00	5,646	82.2	5.2	0.0	8.2	0.0	0.8	3.5	1.8	17.8	2.6
CT 3021.01	6,503	81.0	1.2	0.2	16.0	0.0	0.4	1.2	9.6	19.0	4.1
CT 3022.02	6,971	77.8	4.1	0.0	17.3	0.0	0.8	0.0	5.5	22.2	5.1

TABLE 4.8.10-1 (cont'd)

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 mile of the Northeast Supply Enhancement Project

Facility/Location	Total population [a]	White (%) [a, b]	Black or African American (%) [a]	American Indian and Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian and Other Pacific Islander (%) [a]	Some other race (%) [a]	Two or more races (%) [a]	Hispanic or Latino origin (of any race) (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [a]
New Jersey	8,904,413	68.3	13.5	0.2	9.0	0.0	6.4	2.5	19.0	31.7	10.8
Compressor Station 206											
Somerset County	330,604	68.2	9.1	0.1	16.1	0.0	4.5	2.0	14.0	31.8	5.0
CT 534.02	7,107	37.4	15.8	0.2	38.1	0.0	4.3	4.3	8.6	62.6	1.7
Middlesex County	830,300	61.0	9.8	0.2	23.2	0.0	3.4	2.2	19.6	39.0	8.8
CT 84.03	7,522	44.2	11.9	0.2	41.3	0.0	0.6	1.8	3.9	55.8	8.0

Sources:

[a] U.S. Census Bureau 2016.

[b] White Alone, Not Hispanic or Latino

Grey highlighted values indicate percentage exceeds thresholds defined in text, and is an environmental justice population.

The construction and operation of the proposed Project would affect a mix of racial/ethnic areas in the study area. Not all impacts identified in this EIS are considered to affect minority populations. The primary adverse impacts that could affect minority populations during construction of the Project would be the temporary increases in dust, noise, and traffic. These impacts would occur near all Project facilities and in areas with a variety of socioeconomic backgrounds. The primary adverse impacts that could affect minority populations during operation of the Project would be noise and air emissions associated with new Compressor Station 206.

As detailed throughout this EIS, construction-related impacts would generally be localized to the immediate area surrounding construction, and would diminish with distance from areas of active construction. Transco would implement numerous measures to minimize potential construction-related impacts on communities near the Project facilities, including environmental justice communities. Specifically, Transco would implement a Fugitive Dust Control Plan to control construction-related dust in compliance with state regulations and FERC requirements, and a Traffic Management Plan would be implemented to minimize Project effects on local traffic and transportation systems. Transco would also use construction equipment and vehicles that meet federal engine emissions standards, further minimizing construction air emissions. Construction-related noise would attenuate quickly with distance from work areas and would be minimized by limiting construction to daylight hours in most cases. Transco would also implement specific measures to mitigate the noise from HDD activities along the Madison Loop.

During operation, air emissions from Compressor Station 206 would be minimized by using low NO_x combustion technology. Normal operating emissions would not exceed the NAAQS, which are protective of public health, including the health of sensitive populations. Similarly, noise control measures would be implemented by Transco during operation of Compressor Station 206. Transco would ensure that the operational noise attributable to the compressor station would be less than 55 dBA L_{dn} at nearby NSAs, and the increase in the overall noise due to the new station would be below the threshold considered perceptible to the human ear at most NSAs.

In conclusion, as highlighted in table 4.8.10-1, the populations within one census tract near the Quarryville Loop, two census tracts near Compressor Station 206, and two census tracts near the Madison Loop and onshore segment of the Raritan Bay Loop are considered environmental justice communities. Potentially adverse environmental effects associated with the Project on surrounding communities, including environmental justice communities, would be minimized and/or mitigated, as applicable, and would not be high and adverse. We also determined that the NESE Project would not result in disproportionately high and adverse impacts on minority and low-income populations.

4.9 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires the FERC to take into account the effects of its undertakings on properties listed in or eligible for listing on the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking. Transco, as a non-federal party, is assisting the FERC in meeting our obligations under section 106 by preparing the necessary information, analyses, and recommendations, as allowed by the ACHP's regulations for implementing section 106 at 36 CFR 800.2(a)(3).

4.9.1 Cultural Resources Investigations

Transco consulted with the Pennsylvania, New Jersey, and New York SHPOs to define the cultural resources survey areas for the NESE Project. As required under section 106, the FERC has defined the Project's Area of Potential Effect (APE) as the area whereby direct effects could result from ground-disturbing activities and indirect effects could result from visual, auditory, or atmospheric changes. Direct effects are typically long term and adverse, whereas indirect effects may be temporary or short term. The direct APE for the Project includes the workspace required for the Quarryville, Madison, and Raritan Bay Loops, ATWS, access roads, contractor yards, Compressor Stations 200 and 206, and ancillary facilities as described in section 2.1. The indirect APE includes those areas within viewshed of these proposed facilities for both the onshore and offshore components.

To ensure full coverage of the onshore portion of the direct APE, Transco surveyed a 400-foot-wide corridor along the Quarryville Loop in Pennsylvania and a 300-foot-wide corridor along the Madison Loop and onshore segment of the Raritan Bay Loop in New Jersey, with expansions of the corridor as needed for crossing waterbodies or manmade features. Transco surveyed a 50-foot-wide corridor centered on proposed access roads and the entire footprint of compressor stations and ancillary facilities. The offshore APE for direct Project effects includes a 2,500- to 5,000-foot-wide corridor along the Raritan Bay Loop that encompasses the construction footprint of the proposed pipeline and the area necessary for the anchor spread of marine construction and support vessels. Transco completed onshore Phase I cultural resources surveys of 100 percent of the archaeological APE in Pennsylvania and New Jersey. Offshore cultural resources surveys of the archaeological APE in New York and New Jersey are 100 percent complete. Subsequent to the initial surveys, Transco incorporated new contractor yards, minor realignments, and modified ATWS into the proposed Project. As discussed below, Transco conducted cultural resources reviews or surveys of these additional workspaces.

The indirect APE for historic architectural properties consists of the APE for direct Project effects, plus any areas where changes to the landscape (through removal of vegetation or modifications of surface topography, for example) lie within view of a historic resource, which is defined as any building or structure at least 50 years of age. Viewsheds to and from the Project corridor were terminated where vegetation and/or topography obstructed lines-of-sight, up to 0.8 kilometer (0.5 mile) on each side of the study corridor. The architectural APE also includes up to 0.8 kilometer (0.5 mile) surrounding the proposed aboveground facilities, including the compressor stations, MLVs, and associated access roads. Transco has completed 100 percent of the surveys of the historic architectural properties' APE in Pennsylvania, New Jersey, and New York.

Transco submitted cultural resources survey reports covering archaeological resources and historic architectural properties for Pennsylvania to the FERC and Pennsylvania Historical and Museum Commission (PHMC), i.e., the designated SHPO. Transco submitted a Phase I Archaeological Survey report and an Historic Architectural Survey report for onshore portions in New Jersey, as well as several letter reports detailing the offshore geophysical, geotechnical, and cultural resources surveys to the FERC and the NJHPO. The FERC and the New York SHPO received from Transco the geophysical, geotechnical, and cultural resources survey report for the offshore portion of the Project in New York.

4.9.1.1 Onshore Facilities

Transco completed a Phase I cultural resource survey investigation to locate and identify cultural resources within the direct and indirect Project APE for onshore facilities. The survey effort included archival or desktop research to review previously recorded archaeological sites and aboveground resources, such as historic buildings or structures, within 1 mile of the direct APE, pedestrian reconnaissance (surface collection), shovel testing, and geomorphological assessments.

Transco also completed a geomorphological assessment of the onshore Project components in Pennsylvania and New Jersey. The review determined that the potential for deeply buried cultural deposits was low and did not identify any areas requiring deep testing. The FERC, PHMC, and NJHPO concur.

Visual surveys along the study corridor or windshield surveys from road rights-of-way were used to identify aboveground resources in the direct and indirect APE for all onshore Project components and included a distance of up to 0.8 kilometer (0.5 mile) or until vegetation and/or topography obstructed lines-of-sight.

Pennsylvania

Quarryville Loop

Transco completed the archaeological survey for the Quarryville Loop pipeline corridor, ancillary facilities, access roads, contractor yards, and ATWS. Two archaeological sites were identified within the direct APE. Site 36LA1600 represents a historic artifact scatter dating from the early-19th century, while 36LA218 is characterized as an isolated find dating from an indeterminate pre-contact period. No additional fieldwork was recommended for 36LA218, which was assessed as not eligible for listing on the NRHP. Transco recommended 36LA1600 as eligible of meeting the criteria for listing on the NRHP, and proposed to avoid the site by installing exclusion fencing to maintain a 16.4-foot buffer between construction workspace and site boundaries. The PHMC responded on the November 17, 2016 that the proposed avoidance plan for 36LA1600 was acceptable and concurred that 36LA218 was not elibible for listing on the NRHP. On January 26, 2017 and August 29, 2017, the PHMC concured with the no further work recommendations in the two supplemental reports. We concur.

Transco completed the historic architectural survey for the Quarryville Loop pipeline corridor, ancillary facilities, access roads, contractor yards, and ATWS, resulting in the identification of 26 historic architectural properties within the indirect APE. One farm complex (Key #77811) was previously determined not eligible for the NRHP and no additional recordation was recommended. Two additional resources (Key #102143 and Key #83686) that were previously determined as eligible for listing in the NRHP, were identified just outside of the indirect APE for aboveground structures. Transco recommended the Project would have no direct or indirect impact on the Enola Branch Low Grade Freight Line railroad (Key #102143) or the Hess Road Bridge (Key #83686). The remaining properties represent 21 farmstead complexes, a commerical building, and the Quarryville Presbyterian Retirement Community building. Transco recommended the viewshed of each property is obstructed by trees or would not be affected due to construction across the adjacent open agricultural land; as a result, the properties were not further assessed for eligibility for the NRHP. In its letter of February 13, 2017, the PHMC commented that the Project would have no effect on historic properties, but recommended further evaluation of the Enola Branch Low Grade Freight Line railroad (Key #102143) and the Hess Road Bridge (Key #83686) should the Project scope and/or nature of the Project activities change. We concur.

Transco notified the PHMC that a segment of the Quarryville Loop previously planned to be constructed via HDD would instead be constructed using the open cut trenching method. No additional archaeological survey was conducted as the pipeline corridor was prevously investigated and reported to the PHMC; however, one mid-twentieth century commerical building was recorded within the indirect APE. Transco concluded the structure would not be affected by the Project as its viewshed is obstructed by trees and newer buildings; it was not further assessed for eligibility for the NRHP. In its reply dated October 20, 2017, the PHMC commented that the Project would have no effect on historic properties. We concur.

Transco subsequently completed cultural resources survey of two new workspaces and one associated access road on the Quarryville Loop. No archaeological sites or above ground resources were identified. On January 18 and February 20, 2018 the PHMC concurred that no historic properties would be affected. We concur.

Compressor Station 200

No archaeological sites were identified during the survey of the 7.6-acre expansion of Compressor Station 200. In its letter of November 17, 2016, the PHMC concurred with the recommendations and conclusions in the Phase I cultural resources report concerning Compressor Station 200. We concur.

A total of 12 historic architectural properties were identified during the architectural survey of the indirect APE for Compressor Station 200. Of these, one barn (Key #83403) and two railroad segments (Key #101916 and Key #155409/155997) were previously determined not eligible for the NRHP. The remaining properties represent seven residences or farmstead complexes, the Ebenezer African Methodist Episcopal Church, and the Philadelphia Memorial Park Cemetery. Transco concluded the viewsheds of each property would be obstructed by either trees or topography; as a result, these properties were not further assessed for eligibility for the NRHP. In its letter of February 13, 2017, the PHMC concurred with the recommendations and conclusions in the historic architectural report concerning Compressor Station 200. We concur.

Transco submitted a review request to the PHMC for Compressor Station 200 encompassing 21.4 acres that were characterized as the existing facility and/or which had been previously surveyed for cultural resources. Transco recommended no additional surveys are warrented and the PHMC responded on June 28, 2017 that no historic properites would be affected. We concur.

New Jersey

Madison Loop

Transco completed the archaeological and historic architectural surveys for the Madison Loop pipeline corridor, ancillary facilities, ATWS, access roads, and one contractor yard. No archaeological sites were identified during these investigations. In its letter dated March 30, 2017, the NJHPO commented that no archaeological historic properties would be affected. Transco subsequently completed Phase I cultural resources surveys of four new or expanded access roads and an expansion of contractor yard CY-MI-1-002. No archaeological sites were identified and no additional survey was recommended. The NJHPO concurred with the recommendations on July 28, 2017. We concur.

In December 2017, Transco completed investigations on a new access road and modifications to two previously surveyed access roads. The NJHPO concurred on January 19, 2018 that no cultural resources would be affected. We concur.

Transco subsequently identified an additonal contractor yard, MADI-CY-MI-1-003, and two access roads to the yard, all of which are existing, paved facilities (the parking lot of a former Lowe's Home Improvement store). On April 9, 2018, the NJHPO agreed with Transco's assessment that no historic properties would be affected. We concur.

Transco also identified additional contractor yard MADI-CY-MI-1-004 and two access roads to the yard. The yard and access roads were previously reviewed and approved for use by Transco during construction of the New York Bay Expansion Project (CP15-527-000). Transco notified the NJHPO of its intent to use the yard for the NESE Project, stating that a cultural resources assessment did not identify any historic properties that would be effected by the proposed use. The NJHPO concurred with Transco's assessment on May 10, 2018. We concur.

Transco identified two historic aboveground properties that have been determined as eligible for, but not currently listed on, the NRHP. These include segments of Old Spye Road (Resource #4285) and the Garden State Parkway (Resource #3784). Old Spye Road was constructed of locally manufactured brick in the late-19th century. The Garden State Parkway was built in 1947 as an expressway providing access to shoreline resorts. Transco plans to install the pipeline using the HDD method beneath these active road segments and recommended that there would be no adverse effect to these resources. The NJHPO concurred with the recommendations on March 15, 2017. We also concur.

Raritan Bay Loop

Transco completed the archaeological survey for the onshore portion of the Raritan Bay Loop pipeline corridor, ancillary facilities, ATWS, access roads, and contractor yards. One previously recorded archaeological site (28MI169) was encountered. Site 28MI169 represents an artifact scatter with components dating from the pre-contact Woodland period and 19th-20th century. Transco recommended 28MI169 as eligible of meeting the criteria for listing on the NRHP and proposed to avoid the site by installing the Raritan Bay Loop 70 to 90 feet below ground surface via an HDD, with an archaeological monitor on-site during drilling operations to respond to an inadvertant release of drilling fluid. On March 30, 2017, the NJHPO requested additional information on the proposed avoidance and monitoring plan for site 28MI169, specifically concerning potential effects associated with an inadvertant release of drilling fluid during the HDD. Transco provided information on the low potential of an inadvertant release to affect site 28MI169 on May 1, 2017. The NJHPO concurred with the avoidance plan for 28MI169 on June 8, 2017. We concur.

Transco provided a report to the NJHPO for the onshore portion of the Long CP Power Cable that would extend 1,830 feet northward from the existing Morgan M&R Station into New Jersey State waters. The Long CP Power Cable would also be installed via the HDD method, and Transco indicated that the HDD would extend under site 28MI169 at a depth of 15 to 42 feet, thereby avoiding adverse impacts on the site. No additional cultural resources were identified. The NJHPO concurred with Transco's avoidance of 28MI169 and report recommendations on July 28, 2017. We concur.

Since issuance of the draft EIS, Transco has proposed to use an existing wharf operated by Weeks Marine as a contractor yard (ATWS-RBL-009) to support offshore construction of the Raritan Bay Loop. In a letter dated November 20, 2017, Transco notified the NJHPO of its intent to use the facility, noting that the wharf had been used as a staging area for shoreline restoration efforts in the wake of Superstorm Sandy and as a staging area during constructon of the Rockaway Delivery Lateral Project (CP13-36-000). We conclude that no historic properties would be effected by Transco's proposed use of the site.

Transco completed the historic architectural survey for the onshore segment of the Raritan Bay Loop and identified one railroad segment, one firehouse, and three residential homes within the APE. Of these, the New York and Long Branch Railroad (Resource #4354) has been determined eligible for listing in the NRHP. Transco plans to install the pipeline using the HDD method beneath this active railroad and recommended that there would be no adverse effect to the historic property. The remaining resources were recommended as not eligible for the NRHP, and no further work was recommended. The NJHPO concurred with the recommendations on March 22, 2017. We concur.

Compressor Station 206

Transco completed the archaeological survey for Compressor Station 206, which included the proposed station site, an associated access road, and a pipeline tie-in area, totalling 45.4 acres. One archaeological site was identified during the cultural resources survey. Site 28SO166 is characterized as an early-20th century structural ruin and artifact scatter. No additional fieldwork was recommended for 28SO166, which was assessed as not eligible for listing in the NRHP. Its letter dated March 30, 2017, the

NJHPO concured with Transco's recommendations for site 28SO166 and commented that no archaeological historic properties would be affected. We concur.

Subsequent modifications to the proposed access road and pipeline tie-in locations for Compressor Station 206 resulted in an additional cultural resources survey of 7.1 acres. No archaeological sites were identified and no additional survey was recommended. The NJHPO concurred with the recommendations on July 28, 2017. We concur.

Transco completed the historic architectural survey for Compressor Station 206, resulting in the identification of three historic aboveground properties within the APE of the proposed compressor station. These resources represent two residential houses (Field #FS 6 and FS 7) and a structural ruin associated with newly identified archaeological site 28SO166. This partially collapsed dwelling was recorded within the direct APE of proposed Compressor Station 206. All were recommended as not eligible for the NRHP, and no further work was recommended. The NJHPO concurred with the recommendations on March 15, 2017. We concur.

During the scoping period, we received comments related to known archaeological sites and known historic architectural resources that may be affected by the Project. Specifically, commenters were concerned about several locations with unique resources that may be affected by proposed compressor station 206, including:

- Rockingham House (National Register ID 70000394);
- Withington Estate (National Register ID 84002740);
- Kingston Village Historic District (National Register ID 89002163);
- Kingston Bridge (part of the Kingston Mill Historic District, National Register ID 86000707);
- Delaware and Raritan Canal Historic District (National Register ID 73001105; designated a National Scenic Byway);
- Washington Rochambeau Revolutionary Route (designated a National Historic Trail);
- Millstone Valley Scenic Byway (designated a National Scenic Byway); and
- Higgins Farm.

Each of the NRHP-listed properties are located between 1.5 and 2.0 miles west-southwest of proposed Compressor Station 206. The compressor station would not directly affect the Rockingham House, Withington Estate, Kingston Village Historic District, or Kingston Bridge. The historic architecture survey determined that viewshed from the station to these historic properties is obstructed by mature trees, dense vegetation, existing utility corridors, a solar panal farm, the Trap Rock quarry, and other commercial infrastructure situated between the proposed compressor station site and each historic property. Thus, these resources would not be directly or indirectly affected by construction of Compressor Station 206.

We received several comments regarding the significance of the Delaware and Raritan Canal Historic District, the Washington Rochambeau Revolutionary Route, and the Millstone Valley Scenic Byway to the Revolutionary War. Each of the trails or routes are located between 0.3 and 1.6 miles south-southwest of Compressor Station 206. Today, Route 27 follows the Washington Rochambeau

Revolutionary Route past the proposed compressor station site and is characterized as a two-laned paved road that carries traffic past a mix of residential, commerical, and rural landscapes. While the compressor station would be 0.3 mile west of the route, Transco has indicated the station would be shielded from view by a forested buffer. The historic architecture survey determined that viewshed from the station to these historic properties is obstructed by mature trees, dense vegetation, existing utility corridors, a solar panal farm, the Trap Rock quarry, and other commercial infrastructure situated between the compressor station site and each historic route. Therefore, these resources would not be directly or indirectly impacted by construction of Compressor Station 206.

Several commenters expressed concern regarding potential impacts that Compressor Station 206 may have on adjacent property that has been in the Higgins family for over 200 years, as well as the potential to affect pre-contact Native American sites or sacred grounds. The Higgins family is historically important as they donated land for the establishment of the nearby Village of Kingston. As discussed above, Transco completed an archaeological survey of the proposed compressor station site, including the access road and tie-in pipelines, and recorded one archaeological site (28SO166) characterized as the structural remains of an early-19th century domestic building. No other historic aboveground resources were identifed within the direct or indirect APE. Site 28SO166 was recommended not eligible for listing in the NRHP and the NJHPO concurred with this assessment. We also concur.

4.9.1.2 Offshore Facilities

Transco conducted an off shore cultural resource survey which included geophysical and geotechnical surveys, vibracore sampling, and an aboveground resources reconnaissance for the offshore portions of the Raritan Bay Loop APE in New Jersey and New York. The geophysical survey used dual-frequency and multi-beam echo-sounding bathymetry, Chirp sub-bottom profiling, side-scan sonar imaging, and marine magnetometer mapping along survey tracklines spaced at offsets of 100 feet in order to cover the full width of the direct APE. A series of lines set perpendicular to the primary tracklines and spaced 1,640 feet apart were surveyed to provide verification of all results. Geotechnical vibratory coring was completed along the offshore pipeline APE to "ground truth" the geophysical data and evaluate near-surface conditions.

The architectural, or indirect, APE for temporary effects to historic properties during construction was evaluated for the proposed offshore pipeline corridor and anchor spreads. Once constructed, the offshore portions of the Raritan Bay Loop would be buried at least 4 feet below the seafloor and no aboveground facilities would be present to obstruct the viewshed. We concur.

The NJHPO approved the offshore work plan on October 13, 2016. Transco submitted the Marine Data Collection Plan to the New York SHPO for review on August 8, 2016. While the New York SHPO concurred with the geophysical and geotechnical survey plan on September 8, 2016, additional information was requested on the vibracore methodology and sampling locations once the geophysical survey was completed; Transco submitted this data on October 5, 2016.

New Jersey

The geophysical survey of a 6.0-mile-long, 2,500- to 5,000-foot-wide corridor along the offshore portion of the Raritan Bay Loop in New Jersey has been completed to assess potential effects on cultural resources and to inform on placement of geotechnical bores and vibracores. A total of 20 geotechnical bore locations (BHA6 - BHA19, REV-BHA8, REV-BHA17, REV-BHA22 - REV-BHA25) and 14 alternate geotechnical bore sites (BHA10 - BHA19, BHA6-ALT, BHA7-ALT, BHA9-ALT, and REV-BHA25-ALT) were assessed for the presence of submerged cultural resources using geophysical survey methods. Due to their placement in New Jersey's near-shore waters, remote sensing could not be completed for bore sites BHA3 to BHA5. These locations were bored and the soil barrel samples were reviewed by a geoarchaeologist only. Twenty-two side-scan sonar contacts and 65 magnetic anomalies were identified within 50- to 100-foot buffer areas for all bore locations. The NJHPO requested additional information on two anomalies (SS-BL02-CL_1 and SS-BL09-NO3_2) situated in proximity to BHA8 and BHA11. On October 4, 2018, Transco provided details on those two anomalies and a cultural resources assessment of the geophysical survey results for 10 revised bore locations (BHA10 to BHA19); the NJHPO concurred on October 17, 2016 that the borings could be completed at the assessed locations. Subsequently, in a letter dated October 25, 2016, Transco submitted survey results for seven new bore locations (REV-BHA8, REV-BHA17, REV-BHA22 - REV-BHA25) and one alternate bore site (REV-BHA25-ALT); the NJHPO concurred on November 4, 2016 that the boring could be completed at the assessed locations. We concur.

A total of 15 vibracore testing locations (VC1 to VC4 and VC45 to VC55) and 4 alternate vibracore sites (VC1-ALT, VC3-ALT, VC45-ALT, and VC48-ALT) were identified and have been assessed for the presence of submerged cultural resources. No side-scan sonar contacts and five magnetic anomalies were identified within 50- to 100-foot buffer areas for all vibracore locations. No significant anomalies have been identified around 11 testing sites; however, 4 alternate locations were identified to avoid potential significant anomalies at VC1, VC3, VC45, and VC48. Transco provided the geophysical survey results to the NJHPO on October 17, 2016 and the NJHPO concurred on October 25, 2016 that the vibracore testing could be completed at the assessed locations, avoiding vibracore sites VC1, VC3, VC45, and VC48. We concur.

As a result of the geophysical survey and geotechnical borings Transco recommended supplementary close-order geophysical survey for five targets (B02-001, B09-001, B17-001, B17-002, and B17-003) of archaeological interest along the Raritan Bay Loop. The NJHPO concurred with the recommendations on March 15, 2017. We concur.

Geophysical data identified three targets (BL16-001, BL16-002, and BL17-004) within the anchor handling area that represent submerged cultural resources. Target BL17-004 displayed signatures characterisic of a shipwreck. The remaining targets represent indeterminate anomolies that may represent cultural resources. Transco recommended a 164-foot radius avoidance buffer for all three targets. The geotechical data determined that, while paleo-features are present, transgression has removed the upper sediment layers, thereby removing traces of the pre-contact landforms. Transco recommended that no impact on pre-contact features is anticipated. The NJHPO concurred with these recommendations on June 1, 2017. We also concur.

An Anchor Handling Plan to avoid impacts on potential cultural resources sites within the offshore APE was submitted to NJHPO on June 16, 2017. The NJHPO concurred with the plan on July 27, 2017. We concur.

Transco provided a cultural resources analysis to the NJHPO on February 8, 2017 of the near- and offshore proposed CP power cable and HDD tracking lines route that extends northward from the Raritan Bay Loop centerline into New Jersey State waters. The NJHPO concurred with the analysis but did not provide comments in their response of March 15, 2017 to Transco's filing.

In a letter to the NJHPO dated May 2, 2017, Transco identified six supplemental vibracore locations associated with newly identified workspaces along the Raritan Bay Loop. Of these, VC88 to VC92 are within areas previously surveyed along the Raritan Bay Loop centerline and Transco recommended no additional investigation was warrented prior to geotechnical boring. However, VC93 is associated with the Long CP Power Cable and Subsea Anode Sled that had not been previously surveyed, and recommendations for analyzing the core sample for cultural material were provided. The NJHPO concurred on May 15, 2017 that the vibracore testing could be completed at the assessed locations. Transco filed the results of archaeological monitoring for VC93 with the NJHPO recommending that no evidence of intact pre-contact land surfaces or paleosols are present; the NJHPO concurred with the results on October 12, 2017. We concur.

In letters to the NJHPO dated January 9 and 22, 2018, Transco identified nine supplemental geotechnical soil boring locations along the Raritan Bay Loop and the NJHPO approved the additional locations on January 19 and 30, 2018. An additional 24 boring locations were identified on September 5, 2018 and the NJHPO approved the testing locations on October 4, 2018. Transco requested NJHPO approve 8 more soil bore locations on October 9, 2018; a response from NHHPO has not yet been filed. Transco has not yet filed the testing results or NJHPO comments with the FERC.

As noted in section 2.3.3.8, Transco initially identified 19 submerged historic and/or modern cable lines within the offshore workspace of the Raritan Bay Loop, including 9 early 20th century telegraph cables, 9 submarine communication or electrical transmission cables, and the Neptune Cable (2 crossings), a 21st century electrical transmission cable. The NJHPO requested additional cultural resources review and survey be conducted to determine effects to cable lines. In a conference call with with the NJHPO on July 11, 2017, Transco discussed the geophysical and geotechnical surveys that have been performed and that no historic submarine cables were present in the Project APE. The NJHPO concurred with the assessment and stated that no additional action will be required. Transco completed consultation with NJHPO concerning four additional submarine cables on April 20, 2018, and on May 9, 2018, the NJHPO concurred that the cables are unlikely to be intact or present within the offshore portion of the Project and no additional action will be required. We concur.

Transco has completed surveys of the historic architectural properties within the indirect APE for the offshore portion of the Raritan Bay Loop in New Jersey. The Romer Shoal Light Station is within the offshore APE; no direct or indirect Project impacts are anticipated on this resource. The light station is listed on the NRHP and was damaged in 2012 by Hurricane Sandy, although funding to repair the damage has been allocated. The NJHPO concurred with the recommendation on June 1, 2017. We concur.

New York

The geophysical survey of a 17.4-mile, 3,500- to 5,000-foot-wide corridor along the offshore portion of the Raritan Bay Loop in New York has been completed to assess potential effects on cultural resources and to inform on the placement of vibracores. A total of 72 vibracore testing locations (VC5 - VC44 and VC56 - VC87) were identified and have been assessed for the presence of submerged cultural resources. Multiple side-scan sonar contacts and 12 magnetic anomalies were identified within 75- to 100-foot buffer areas that resulted in the assessment of 7 alternate vibracore sites (VC33-ALT, VC41-ALT, VC61-ALT, VC73-ALT, VC79-ALT, VC83-ALT, and VC86-ALT). Transco provided the geophysical survey results to the New York SHPO for review in five separate reports in October 2016; between October 11, 2016 and November 3, 2016, the New York SHPO concurred on each report that the vibracore testing could be completed at the assessed locations and alternate sites. We concur.

The unanticipated discovery of archaeological materials encountered during coring of vibracore VC60 resulted in notification of the New York SHPO and state police on December 16, 2016. This domestic-related material dated from the 19th century and likely represents a historic offshore refuse deposal of urban debris. Transco recommended the site as not eligible for listing on the NRHP, and on January 18, 2017 the New York SHPO concured with this recommendation. We concur.

Transco filed preliminary results of the offshore pipeline corridor geophysical survey and geotechnical borings and recommended additional close-order assessment of eight targets within the proposed centerline corridor with signatures possibly indicating the presence of submerged cultural resources. The New York SHPO concurred with the preliminary survey results in their response of

February 16, 2017. Close-order assessment of seven targets was completed; however, subsequent modification of the Raritan Bay Loop centerline shifted target BL13-001 offline and a close-order survey was not conducted for this target location.

Full analysis of the geophysical data identified 17 targets within the centerline corridor and anchor handling area that represent submerged resources. Targets BL10-001, BL11-002, BL12-002, BL14-002, and BL14-004 displayed signatures charaterized as shipwrecks or debris from a wreck. Target BL14-010 represents the remains of the Old Orchard Shoal Lighthouse, a NRHP-listed property, that was destroyed during Hurricane Sandy in 2012 and no longer retains significant structural integrity. The remaining targets represent indeterminate anomolies that may represent cultural resources. Transco recommended a 164-foot-wide radius avoidance buffer for the majority of these targets; however, the avoidance buffer for target BL14-002 was increased to a 275-foot-wide radius, and decreased to an 144.5-foot-wide radius for target BL12-002. The geotechical data determined that, while paleo-features are present, transgression has removed the upper sediment layers, thereby removing traces of the pre-contact landforms. Transco recommended that no effect on pre-contact features is anticipated. The New York SHPO concurred with the recommendations on May 23, 2017, and requested graphics for the 17 submerged targets illustrating the avoidance area and Project alignment. On June 16, 2017, Transco provided the Anchor Handling Plan to the New York SHPO, which included enhanced graphics showing avoidance areas for the potential cultural resources sites within the offshore APE for each identified submerged target. In a letter dated June 27, 2017, the New York SHPO concurred with the Plan. We concur.

In letters to the New York SHPO dated January 16, 19, 22, 2018, Transco identified 28 supplemental geotechnical soil boring locations along the Raritan Bay Loop; the New York SHPO stated it had no concerns regarding the proposed testing program on January 23, 2018. Transco identified an additional eight geotechnical soil borings in a letter to the New York SHPO dated February 27, 2018 and the New York SHPO again stated it had no concerns regarding the proposed testing program on February 28, 2018. An additional 122 boring locations were identified by Transco on September 5 and October 5, 2018 and the New York SHPO stated it had no concerns regarding the proposed testing program on September 6 and October 11, 2018. Transco has not yet filed the testing results or New York SHPO comments with the FERC.

On July 3, 2018, Transco and the New York SHPO discussed strategies to avoid impacts on Target No. BL12-002 and confirmed the pipeline would be offset to ensure an adequate buffer around the debris field. Transco has not provided the supporting documentation and evaluation reports to New York SHPO and FERC.

As discussed above, Transco initially identified 19 submerged historic and/or modern cable lines within the offshore portion of the Raritan Bay Loop, including 9 early 20th century telegraph cables, 9 submarine communication or electrical transmission cables, and the Neptune Cable (2 crossings), a 21st century electrical transmission cable. Transco, in a letter to the New York SHPO dated May 31, 2017, requested recommendations on how to proceed with NRHP significance considerations for 16 of the cable crossings. The New York SHPO requested a historic context statement for the various cables on June 5, 2017, which Transco provided on June 16, 2017. Transco provided additional information to the SHPO on July 7, 2017 confirming no historic submarine cables are in the Project APE and no additional field work is recommended. The New York SHPO concured with the recommendations on July 14, 2017. We concur.

Transco completed the surveys of the historic architectural properties within the indirect APE for the offshore portion of the Raritan Bay Loop in New York. As discussed above, only the foundations remain of the Old Orchard Shoal Lighthouse, a NRHP-listed property, that was destroyed during Hurricane Sandy in 2012. The lighthouse was identified by Transco as Target BL14-010; it no longer retains significant structural integrity and, as it is stands almost 800 feet from the proposed centerline, it would not be adversely affected by the Project. The New York SHPO concurred with the recommendations on May 23, 2017. We concur.

4.9.2 Cultural Resources Consultations

On August 24, 2016, we sent copies of the NOI for the NESE Project to a wide range of stakeholders, including the ACHP, the Bureau of Indian Affairs, the SHPOs, and Native American tribes that may have an interest in the Project. The NOI contained information about section 106 of the NHPA and stated that the notice is used to initiate consultations with the SHPO, and to solicit their views and those of other government agencies, interested tribes, and the public on the Project's potential effects on historic properties.

In addition, Transco contacted 11 local organizations to provide them an opportunity to identify any concerns related to historic properties or cultural significance that may be affected by the Project, including the Lancaster and Chester County Historical Societies in Pennsylvania; the Middlesex County Cultural Heritage Commission, Somerset County Historical Society, Monmouth County Historic Association, New Jersey Historical Divers Association, New Jersey Maritime Museum, and Ocean Wreck Divers of New Jersey in New Jersey; and the Brooklyn Historical Society, The Long Island Maritime Museum, and The National Lighthouse Museum in New York. No responses have been received to date.

4.9.2.1 Federally Recognized Indian Tribes

On September 29, 2016, we sent letters to 17 federally recognized Indian tribes, including the Absentee Shawnee Tribe of Oklahoma, Cayuga Nation of New York, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Mohegan Tribe, Oneida Indian Nation, Oneida Tribe of Indians of Wisconsin, Onondaga Nation, Saint Regis Mohawk Tribe, Seneca Nation of Indians, Seneca-Cayuga Tribe of Oklahoma, Shawnee Tribe of Oklahoma, Shinnecock Indian National Tribe, Stockbridge-Munsee Community of Wisconsin, Tonawanda Band of Seneca Indians of New York, and Tuscarora Nation to request their comments on the project. The Stockbridge-Munsee Community of Wisconsin requested copies of the cultural resources survey reports on February 6, 2017 and indicated they may wish to participate in site monitoring during construction. The cultural resources survey reports were submitted by Transco to the tribe on February 14, 2017 and May 22, 2017. No further responses have been received to date.

In addition to our contacts with the tribes, Transco or its contractor, R. Christopher Goodwin & Associates, separately contacted the same 17 tribes on July 15, 2016 to provide them an opportunity to identify any concerns related to properties of traditional religious or cultural significance that may be affected by the Project. Transco identified and contacted an additional four state-recognized tribes that might attach cultural or religious significance to cultural resources in the Project area, including the Munsee Delaware Indian Nation, Nanticoke Lenni-Lenape Indians, Powhatan Renape Nation, and Ramapough Lenape Nation. The Delaware Tribe of Indians, and the Eastern Shawnee Tribe of Oklahoma responded with a request to be consulted on the Project due to the potential to affect properties of traditional and cultural significance. They also requested a copy of the technical reports from Transco to enable an evaluation of the Project and its potential impacts on archaeological and human remains, and requested notification if unanticipated discoveries are encountered during construction. Transco provided copies of the Phase I reports to the Delaware Tribe of Indians and Eastern Shawnee Tribe of Oklahoma on May 22, 2017. In March 2017, Transco sent follow up letters to 20 tribes providing a brief update on the status of cultural resources surveys and to provide them an opportunity to identify any concerns related to properties of traditional cultural properties or sacred sites that may be affected by the Project. The Munsee Delaware Indian Nation and Delaware Tribe of Indians responded that no religious or culturally significant sites are within the Project area. The Stockbridge-Munsee Community of Wisconsin responded that, due to the lack of cultural resource findings, they have no outstanding concerns in the Section 106 process. However, these three tribes requested to be notified if unanticipated discoveries are encountered during construction. On April 2, 2018 Transco submitted copies of three supplemental reports encompassing results of surveys in Pennsylvania and New Jersey to the Stockbridge-Munsee Mohican Tribe. In August 2018, Transco sent follow up letters to the same 21 tribes stating that no onshore pre-contact or historic archaeological sites or submerged landforms indicative of past human activity would be affected by the proposed action. On September 5, 2018, the Oneida Indian Nation responded that they had no comment on the Project and requested to be notified if unanticipated discoveries are encountered during construction. Transco sent a follow up letter to the Powhatan Renape Nation stating that no onshore pre-contact or historic archaeological sites or submerged landforms indicative of past human activity would be affected by the proposed action. No other responses have been received to date.

4.9.3 Unanticipated Discovery Plans

Transco filed Unanticipated Discovery Plans (UDPs) for Pennsylvania, New Jersey, and New York with us as part of its application and to the PHMC, NJHPO, and New York SHPO. The plans address measures that would be implemented in the event cultural resources or human remains are encountered during construction on both the onshore and offshore Project segments. The plans also provide for the notification of interested parties, including Native American tribes, in the event of any discovery. The NJHPO and New York SHPO provided comments and each requested revisions to the plans; Transco has resubmitted revised plans. On September 19, 2017, the PHMC agreed with the revised onshore UDP for Project segments in Pennsylvania. The NJHPO agreed with the onshore and offshore UDPs in its December 1, 2016 letter, and the New York SHPO agreed with the offshore UDP on November 11, 2016. We requested revisions to the plans, and Transco resubmitted revised plans. We find the revised plans to be acceptable.

4.9.4 Impacts and Mitigation

Construction and operation of the NESE Project could potentially affect historic properties (i.e., cultural resources listed on or eligible for the NRHP). These historic properties could include pre-contact or historic archaeological sites, districts, buildings, structures, and objects, as well as locations with traditional value to Native Americans or other groups. Direct effects could include destruction or damage to all, or a portion, of an historic property. Indirect effects could include the introduction of visual, atmospheric, or audible elements that affect the setting or character of an historic property.

If NRHP-eligible resources are identified that cannot be avoided, Transco would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the Project and after the FERC provides written notification to proceed.

Compliance with section 106 of the NHPA has not been completed for the NESE Project. Transco has not completed consultations with the NJHPO and New York SHPO regarding additional offshore geotechnical testing along Raritan Bay Loop. To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **Transco should <u>not begin construction</u> of the Raritan Bay Loop and/or use of associated temporary work areas <u>until</u>:**

  a. Transco files with the Secretary the results from all supplemental geotechnical soil borings along the Raritan Bay Loop, any necessary cultural resource evaluation reports and avoidance plans, and the NJHPO and New York SHPO comments;

b. **the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and**

c. **the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans, and notifies Transco in writing that construction may proceed on the Raritan Bay Loop.**

All materials filed with the Commission containing <u>location, character, and ownership</u> information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "<u>CUI//PRIV - DO NOT RELEASE</u>."

4.10 AIR QUALITY AND NOISE

4.10.1 Air Quality

This section describes existing air quality; identifies the construction and operating air emissions and projected air quality impacts; and outlines methods that would be used to achieve compliance with regulatory requirements for the Project facilities.

The CAA, as amended in 1977 and 1990, is the basic federal statute governing air pollution. During construction, short-term emissions would be generated by operation of equipment, land disturbance, and increased traffic from worker and delivery vehicles. Construction would occur over a period of about 1 year across three states (Pennsylvania, New Jersey, and New York). Operation of the new and modified compressor stations would result in long-term emissions. Construction and operation air emissions and mitigation measures are discussed in sections 4.10.1.5 and 4.10.1.6.

4.10.1.1 Air Pollutants

Ambient air quality is protected by federal and state regulations. Under the CAA, the EPA established the NAAQS to protect human health and public welfare. These standards incorporate short-term (hourly or daily) levels and long-term (annual) levels to address acute and chronic exposures to the pollutants, as appropriate. The NAAQS include primary standards that are designed to protect human health, including the health of sensitive individuals such as children, the elderly, and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including visibility, vegetation, animal species, economic interests, and other concerns not related to human health. Individual states may set air quality standards that are at least as stringent as the NAAQS. Pennsylvania, New Jersey, and New York have adopted the NAAQS. In addition, Pennsylvania has established additional standards for beryllium, fluorides, and hydrogen sulfide (PADEP, 2017d). New Jersey has additional ambient air quality standards which differ from the NAAQS, including an annual and 24-hour standard for total suspended particulates and a 1-hour ozone standard, (NJDEP, 2018).

The NAAQS are set for seven principal pollutants that are called "criteria pollutants," and are listed on the EPA's website (EPA, 2016c). These criteria pollutants are ground-level ozone, carbon monoxide (CO), NO_x, SO_2, fine particulate matter (inhalable particulate matter with an aerodynamic diameter less than or equal to 10 microns [PM_{10}] and less than or equal to 2.5 microns [$PM_{2.5}$]), and airborne lead. Ozone is not directly emitted into the atmosphere from an emissions source; it develops as a result of a chemical reaction between NO_x and VOCs in the presence of sunlight. Therefore, NO_x and VOCs are often referred to as ozone precursors and are regulated to control the potential for ozone formation. VOCs are defined as any compound of carbon which participates in atmospheric photochemical reactions; however, VOCs do not include CO and CO_2, nor methane (CH_4) and ethane (among other organic compounds), which have been determined to have negligible photochemical reactivity (40 CFR Part 51.100(s)(1)). VOCs associated with transmission-quality natural gas are limited to butane, propane, pentane, and hexane. Table 4.10.1-8 provides the natural gas constituents present at Transco's Compressor Station 200.

GHG produced by fossil-fuel combustion are CO_2, CH_4, and nitrous oxide (N_2O). Classification of GHGs as a pollutant is not related to toxicity. GHGs are non-toxic and non-hazardous at normal ambient concentrations, and there are no applicable ambient standards or emission limits for GHG under the CAA. GHG emissions due to human activity are the primary cause of increased levels of all GHGs since the industrial age. These elevated levels of GHGs are the primary cause of warming of the climate system since the 1950s. These existing and future emissions of GHGs, unless significantly curtailed, will cause further warming and changes to the local, regional, and global climate systems. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_2e). The CO_2e takes into account the global warming potential (GWP) of each GHG. The GWP is a ratio relative to CO_2 of a particular GHG's ability to absorb solar radiation as well its residence time within the atmosphere. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298.[32] We received comments on the amount and impacts of GHG emissions the Project would contribute. In compliance with the EPA's definition of air pollution to include GHGs, we have provided estimates of GHG emissions for construction and operation, as discussed throughout section 4.10.1. Potential cumulative impacts from GHG emissions (i.e., climate change) are discussed in section 4.12.4.

Hazardous air pollutants (HAPs), also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer (carcinogens) or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. There are no national air quality standards for HAPs but their emissions are limited through permit thresholds and technology standards. The states of Pennsylvania, New Jersey, and New York maintain regulations limiting emissions of HAPs (or air toxics). These programs are discussed in section 4.10.1.3.

4.10.1.2 Existing Air Quality

The Project would be constructed in the Northeast portion of the continental United States. The average annual temperature in the coastal regions, especially the more southern areas, is in the 50 °F to 60 °F range. Average daily temperatures are generally lowest in January and highest in July. Summers are warm and humid, with temperatures in excess 90 °F, and tend to be the rainiest season. The Northeast region has four distinct seasons, each of which can produce potentially dangerous storms. The Northeast is subject to a strong seasonal cycle and is often affected by extreme events such as ice storms, floods, droughts, heat waves, hurricanes, and nor'easters. Large temperature and precipitation extremes are common in the region, although precipitation is generally distributed evenly throughout the year. The Northeast averages about 40 inches of precipitation annually, with between 17 and 37 inches of snowfall. During winter months, the average temperatures range from 8 °F to 35 °F, with occurrences of temperatures below 0 °F. Snowstorms and blizzards occur during winter months and thunderstorms are characteristic of the region during the other seasons (NOAA, 2013b).

The Project would be constructed in three air quality control regions (AQCRs), described below in table 4.10.1-1. AQCRs are areas established by the EPA and local agencies for air quality planning purposes, in which State Implementation Plans (SIPs) describe how the NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions such as large metropolitan areas where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or subject area within an AQCR (such as a county or multiple counties), is designated,

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[32] These GWPs are based on a 100-year time period. We have selected their use over other published GWPs for other timeframes because these are the GWPs that the EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

based on compliance with the NAAQS, as attainment, unclassifiable, maintenance, or nonattainment, on a pollutant-by-pollutant basis. The Project is also located within the Northeast Ozone Transport Region (OTR). The OTR (42 USC §7511c) includes 11 northeastern states in which ozone transports from 1 or more states and contributes to a violation of the ozone NAAQS in 1 or more other states. Stationary sources in these states are subject to more stringent permitting requirements, and various regulatory thresholds are lower for the pollutants that form ozone, even if they meet the ozone NAAQS.

Areas in compliance, below the NAAQS, are designated as attainment, while areas not in compliance, or above the NAAQS, are designated as nonattainment. Areas previously designated as nonattainment that have since demonstrated compliance with the NAAQS are designated as maintenance for that pollutant. Maintenance areas may be subject to more stringent regulatory requirements similar to nonattainment areas to ensure continued attainment of the NAAQS. Areas that lack sufficient data are considered unclassifiable and are treated as attainment areas. The attainment status for all counties affected by the Project is shown in table 4.10.1-1 (EPA, 2016d).

TABLE 4.10.1-1

NAAQS Attainment Status of the Northeast Supply Enhancement Project

Location	AQCR	Ozone	$PM_{2.5}$	NO_2, PM_{10}, CO, SO_2
PENNSYLVANIA				
Quarryville Loop (Lancaster County)	South Central Pennsylvania Intrastate	Lancaster Co Marginal Ozone Nonattainment Area, Northeast OTR	Attainment (2012) Maintenance – moderate (2006 and 1997)	Attainment
Compressor Station 200 Modification (Chester County)	Metropolitan Philadelphia Interstate	Philadelphia-Wilmington-Atlantic City (PA-NJ-MD-DE) Marginal Ozone Nonattainment Area, Northeast OTR	Attainment (2012) Maintenance – moderate (2006 and 1997)	Attainment
NEW JERSEY				
Madison Loop (Middlesex County)	NJ-NY-CT Interstate	NJ-NY-CT Ozone Nonattainment Area	Attainment (2012) Maintenance – former Subpart 1 (2006 and 1997)	Attainment
Compressor Station 206 (Somerset County)	NJ-NY-CT Interstate	NJ-NY-CT Ozone Nonattainment Area	Attainment (2012) Maintenance – former Subpart 1 (2006 and 1997)	Attainment
NEW JERSEY/NEW YORK				
Raritan Bay Loop – Offshore	NJ-NY-CT Interstate	NJ-NY-CT Ozone Nonattainment Area	Attainment (2012) Maintenance – former Subpart 1 (2006 and 1997) [a]	Attainment

[a] Using nearest terrestrial county designation status.

The majority of operational emissions from the NESE Project would result from operation of proposed Compressor Station 206. The EPA and state and local agencies have established a network of ambient air quality monitoring stations to measure and track the background concentrations of criteria pollutants across the United States. Data were obtained from representative air quality monitoring stations to characterize the background air quality for each facility location and are presented in tables 4.10.1-2 and 4.10.1-3.

TABLE 4.10.1-2

Representative Ambient Air Quality Data – Quarryville Loop and Compressor Station 200

Pollutant	Averaging Period	Monitor Site	Monitor Value
CO	8-hour [a]	AQS 10-003-2004 Wilmington, Delaware	1.2 ppm
	1-hour [a]		1.6 ppm
Lead	Rolling 3-month	AQS 10-003-2004 Wilmington, Delaware	0.0 µg/m³
NO_2	Annual [b]	AQS 42-045-0002 Chester, Pennsylvania	9.35 ppb
	1-hour [c]		45.0 ppb
Ozone	8-hour [d]	AQS 42-029-0100 Chester County, Pennsylvania	0.069 ppm
$PM_{2.5}$	Annual [e]	AQS 42-029-0100 Chester County, Pennsylvania	10.9 µg/m³
	24-hour [c]		26.5 µg/m³
PM_{10}	24-hour [a]	AQS 42-071-0007 Lancaster, Pennsylvania	44.0 µg/m³
SO_2	3-hour [a]	AQS 42-045-0002 Chester, Pennsylvania	16.0 ppb
	1-hour [f]		11.3 ppb

[a] Maximum second high (1 year) from 2013 to 2015 period. The EPA AirsData does not provide SO_2 3-hour values, so 1-hour second high from the 3-year period was used.
[b] Maximum 1-year average from the 2013 to 2015 3-year-period
[c] 98th percentile averaged over the 2013 to 2015 3-year period.
[d] Fourth high averaged over the 2013 to 2015 3-year period.
[e] Average over the 2013 to 2015 3-year period.
[f] 99th percentile averaged over the 2013 to 2015 3-year period.
AQS = air quality standard
ppb = parts per billion
ppm = parts per million
µg/m³ = micrograms per cubic meter

TABLE 4.10.1-3

Representative Ambient Air Quality Data – Compressor Station 206, Madison Loop, and Raritan Bay Loop

Pollutant	Averaging Period	Monitor Site	Monitor Value
CO	8-hour [a]	AQS 34-039-0004 Elizabeth, New Jersey	1.8 ppm
	1-hour [a]		2.4 ppm
Lead	Rolling 3-month	AQS 42-101-0014 Philadelphia, Pennsylvania	0.0 µg/m³
NO_2	Annual [b]	AQS 34-023-0011 East Brunswick, New Jersey	10.25 ppb
	1-hour [c]		45.0 ppb
Ozone	8-hour [d]	AQS 34-023-0011 East Brunswick, New Jersey	0.073 ppm
$PM_{2.5}$	Annual [e]	AQS 34-023-0006 North Brunswick, New Jersey	8.0 µg/m³
	24-hour [c]		19.7 µg/m³
PM_{10}	24-hour [a]	AQS 42-101-0048 Philadelphia, Pennsylvania	64 µg/m³
SO_2	3-hour [a]	AQS 34-039-0004 Elizabeth, New Jersey	29.0 ppb
	1-hour [f]		14.0 ppb

[a] Maximum second high (1 year) from 2013 to 2015 period. The EPA AirsData does not provide SO_2 3-hour values, so 1-hour second high from 3-year period was used.
[b] Maximum 1-year average from the 2013 to 2015 3-year-period
[c] 98th percentile averaged over the 2013 to 2015 3-year period.
[d] Fourth high averaged over the 2013 to 2015 3-year period.
[e] Average over the 2013 to 2015 3-year period.
[f] 99th percentile averaged over the 2013 to 2015 3-year period.
AQS = air quality standard
ppb = parts per billion
ppm = parts per million
µg/m³ = micrograms per cubic meter
Source: EPA, 2017e.

4.10.1.3 Air Quality Regulatory Requirements

New Source Review

New Source Review (NSR) is a preconstruction permitting program designed to protect air quality when air pollutant emissions are increased either through the modification of applicable existing stationary sources or through the construction of an applicable new stationary source of air pollution. Proposed new or modified air pollutant emissions sources must undergo an NSR permitting process prior to construction or operation. Through the NSR permitting process, federal, state, and local regulatory agencies review and approve project construction plans, and regulate pollutant increases or changes, emissions controls, and other details. The agencies then issue construction permits that include specific requirements for emissions control equipment and operating limits. NSR includes the Prevention of Significant Deterioration (PSD) and Nonattainment NSR permitting programs for applicable new/modified major sources of air emissions in attainment (PSD) or nonattainment (Nonattainment NSR).

Except for an emergency generator permitted to operate 100 hours per year for testing and maintenance, no permanent emissions sources are proposed at Compressor Station 200 and NSR would not apply. On June 12, 2017, the PADEP indicated in its Request for Determination review that the station would not require a Plan Approval/Operating Permit.[33] Table 4.10.1-5 in section 4.10.1.6 provides the potential operational emissions for Compressor Station 206. Compressor Station 206 would be constructed in a nonattainment area, but would be a minor source under Nonattainment NSR (less than 25 tons per year (tpy) of NO_x and VOC); therefore, minor source NSR would apply and Transco would be required to obtain a minor source permit from the NJDEP as codified at NJAC 7:27-8. Transco received its air permit for Compressor Station 206 on September 7, 2017. Pennsylvania and New Jersey State air quality regulations applicable to the NESE Project are discussed later in this section.

Title V Operating Permitting

Title V is a federal operating permit program delegated to each state. Facilities are classified as major or minor sources based on their potential to emit criteria pollutants and HAPs compared to threshold levels. Compressor Station 200 is currently a Title V major source and the proposed modifications would not change its status. No new appreciable increase in emissions is proposed at the site.

Compressor Station 206 would be constructed in an ozone nonattainment area (8-hour, 2008 standard). Table 4.10.1-5 provides the estimated potential-to-emit facility emissions at Compressor Station 206 for NO_x and VOC, which are ozone precursors. The emissions from Compressor Station 206 for all criteria pollutants would be below the major source Title V thresholds, and thus Compressor Station 206 would be considered a minor source and state operating permit requirements would apply.

New Source Performance Standards

The EPA promulgates New Source Performance Standards (NSPS) that establish emission limits and fuel, monitoring, notification, reporting, and recordkeeping requirements for new or significantly modified stationary source types or categories. NSPS Subpart JJJJ (*Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*) sets emission standards for NO_x, CO, and VOC. Subpart JJJJ would apply to the emergency generators at Compressor Stations 200 and 206. Transco would comply with all applicable requirements of Subpart JJJJ. Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, regulates emissions of NO_x and SO_2. This subpart would apply to the

[33] FERC Docket No. CP17-101, Accession No. 20170720-5142.

new compressor units installed at Compressor Station 206. Transco would be required to comply with applicable emission limits and monitoring, reporting, and testing requirements of this subpart.

On May 12, 2016, the EPA issued three final rules, including the Final Updates to New Source Performance Standards and Final Source Determination Rule, that together will curb emissions of CH_4, smog-forming VOCs, and toxic air pollutants from new, reconstructed, and modified oil and gas sources. The final rules limit CH_4 emissions from oil and gas sources. For example, owners/operators are required to monitor and repair leaks on an established schedule to limit fugitive emissions, and emissions limits have been established for certain natural gas facilities. Regarding natural gas transmission facilities, compressor station owner/operators are required to develop a leak monitoring plan and use optical gas imaging (or an alternate EPA method, "Method 21") to conduct leak surveys. On October 20, 2016, the EPA also issued its Control Techniques Guidelines for the Oil and Natural Gas Industry to inform state, local, and tribal agencies on what constitutes reasonably available control technology. On April 18, 2017, the EPA issued a 90-day stay on the June 3, 2017 compliance date for the fugitive emissions monitoring requirements. The EPA later sought to impose a 2-year stay while it reconsidered the rules; however, in its July 31, 2017 decision, the U.S. Court of Appeals for the District of Columbia Circuit ruled that the EPA could not suspend the rules. On February 23, 2018, the EPA amended two narrow provisions of the 2016 NSPS rules. The amendment applicable to the Project removes the requirement that fugitive emissions (leak) repairs at natural gas facilities, including transmission compressor stations, be performed during unplanned or emergency shutdowns. Instead, repairs of leaking components would occur during the next planned shutdown, planned blowdown, or within 2 years, whichever is earlier. Transco would be required to comply with all applicable standards and requirements set forth by these final rules and amendments.

National Emission Standards for Hazardous Air Pollutants

Under the CAA, the National Emission Standards for Hazardous Air Pollutants for Source Categories (NESHAPs) regulate HAP emissions from stationary sources by setting emission limits and monitoring, testing, recordkeeping, and notification requirements. Subpart ZZZZ (*National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*) would apply to the natural gas-fired emergency electrical power generators at Compressor Stations 200 and 206. Transco would be subject to all applicable Subpart ZZZZ monitoring, recordkeeping, and reporting requirements and/or would comply with NESHAPs Subpart ZZZZ by complying with NSPS Subpart JJJJ requirements.

We received comments regarding the emission of carcinogens, such as formaldehyde and other HAPs, that could be emitted from Compressor Station 206. Table 4.10.1-6 provides the potential HAP emissions for Compressor Station 206. Under NESHAP, Compressor Station 206 would be considered a minor source of HAPs.

Greenhouse Gas Reporting Rule

The EPA established the final Mandatory Greenhouse Gas Reporting Rule, requiring the reporting of operational GHG emissions from applicable sources that emit greater than or equal to 25,000 metric tons of CO_2e in 1 year. Recent additions to the Mandatory Reporting Rule effective for calendar year 2016 require reporting of GHG emissions generated during operation of natural gas pipeline transmission systems, which include blowdown emissions, equipment leaks, and vent emissions at compressor stations, as well as blowdown emissions between compressor stations.

Based on the emission estimates presented, actual GHG emissions from operation of Compressor Station 206 has the potential to exceed the 25,000 tpy reporting threshold for the Mandatory Reporting Rule. Therefore, Transco would likely be required to report GHG emissions from the new compressor station. Modifications at Compressor Station 200 would not include any new sources of air emissions, including GHGs.

Although this rule does not apply to construction emissions, we have provided GHG construction and operational emission estimates, as CO_2e, for accounting and disclosure purposes throughout section 4.10.1.5.

Risk Management Plan Rule

Commenters requested the development of a risk management plan (RMP) and expressed concern about onsite quantities of urea. The EPA has established accidental release prevention and RMP requirements as part of 40 CFR Part 68, *Chemical Accident Prevention Provisions*, implementing section 112(r) of the CAA. The Risk Management Program is about reducing chemical risk at the local level. The RMP information helps local fire, police, and emergency response personnel (who must prepare for and respond to chemical accidents), and is useful to citizens in understanding the chemical hazards in communities (EPA, 2009). Part 68 specifically lists regulated flammable and toxic substances and their "thresholds quantities" for determining the applicability of the RMP Rule. If a regulated substance is handled, stored, or processed in volumes greater than threshold quantities at a stationary source, then an RMP must be prepared (and revised/resubmitted every 5 years).

Transco would install a urea-based selective catalytic reduction (SCR) system to control NO_x emissions for the proposed turbines at Compressor Station 206. Urea is not a regulated substance under the RMP Rule; therefore, Compressor Station 206 would not be subject to requirements under 40 CFR 68. No substances regulated by Part 68 would be stored at Compressor Station 200; therefore, the RMP Rule would not apply.

Further, when EPA issued the final rule for chemical accident prevention provisions (Federal Register: January 6, 1998 Volume 63, Page 639-645), it clarified that transportation activities subject to 49 CFR Part 192 are exempt from the definition of a stationary source under this regulation. Because Compressor Station 206 is subject to 49 CFR Part 192, the Chemical Accident Prevention Provisions do not apply.

State Regulations

Transco would be required to obtain an air quality permit (or waiver thereof) from the applicable air permitting authority for Compressor Stations 200 and 206. Compressor Station 200 currently operates under an existing major source Title V permit and the NESE Project would not change this status. Transco applied for an air permit with the NJDEP for Station 206 on January 4, 2017. The process of obtaining the air permit involves the review and implementation of state regulations. Air quality rules for Pennsylvania and New Jersey can be found in the Pennsylvania Code and NJAC, respectively (see additional discussion below).

No air quality permits would be required in the State of New York. State air quality regulations that would establish emission limits or other restrictions in addition to those required under federal regulations are summarized below. Transco would comply with all applicable state air quality rules and regulations.

<u>Pennsylvania</u>

The air quality regulations for the Commonwealth of Pennsylvania are codified in Title 25, subpart C, Article III of the Pennsylvania Code (25 Pennsylvania Code 121-145). Transco would modify Compressor Station 200 (Chester County) as part of the Project. On June 12, 2017, the PADEP determined that Compressor Station 200 would not require a Plan Approval.[34] The rules outlined below may apply to the Project.

- General Provisions (25 Pennsylvania Code 121): Contains provisions to provide for the control and prevention of air pollution, prohibits the use of stack heights exceeding good engineering practices or dispersion techniques to conceal or dilute emissions to circumvent violation of an air quality regulation.

- Prohibition of Certain Fugitive Emissions (25 Pennsylvania Code 123.1): Prohibits the emission of fugitive air contaminants from non-exempted sources and requires facilities to minimize airborne particulate emissions.

- Fugitive Particulate Matter (25 Pennsylvania Code 123.2): Prohibits visible particulate matters emissions outside of the facility's property.

- Particulate Matter Limits for Combustion Units (25 Pennsylvania Code 123.11): Establishes particulate matter emissions from combustion sources to $3.6E^{-0.56}$ pounds per British thermal unit.

- Sulfur Compound Emissions for Combustion Units (25 Pennsylvania Code 123.22): Establishes SO_2 limits from combustion units.

- Odor Emissions Limitations (25 Pennsylvania Code 123.31): Prohibits the emission of malodorous air contaminants from any source if it is detectable outside the property line.

- Visible Emissions Limitations (25 Pennsylvania Code 123.41): Establishes opacity limits for visible emissions.

Pennsylvania maintains regulations to control emission of toxic air pollutants. These regulations generally align with federal air permitting programs, such as NESHAP and NSPS, and include passenger vehicle tailpipe emissions and diesel fuel/reformulated gas requirements. No new long-term stationary emission sources are proposed in Pennsylvania as part of the NESE Project.

<u>New Jersey</u>

Air quality regulations in New Jersey are codified at Title 7, Chapter 27 of the NJAC (subchapters 1 through 34. Transco would construct Compressor Station 206 in Somerset County, New Jersey. The rules outlined below may apply to the Project.

- Control and Prohibition of Smoke from Combustion Fuel (NJAC 7:27-3.5): Applies to stationary internal combustion engines and stationary turbine engines. The new simple cycle turbines at Compressor Station 206 would meet the requirements in this regulation.

- Control and Prohibition of Particles from Combustion Fuel (NJAC 7:27-4): Limits particulate emissions from the combustion of fuel. NJAC 7:27-4.2(a) limits the maximum allowable particulate emission rate for each combustion turbine to 17.47 pounds per hour.

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[34] The PADEP's determination letter was included in Transco's July 20, 2017 Supplemental Filing to the FERC, Accession No. 20170720-5142.

Transco is proposing an hourly particulate matter emission limit of 2.4 pounds per hour for each combustion turbine and would comply with this rule.

- Permits and Certificates for Minor Facilities (NJAC 7:27-8.2(c)1): Requires commercial fuel burning equipment that has a maximum rated heat input of 1,000,000 British thermal units per hour or greater to obtain a permit prior to construction and operation. The maximum rated heat input of each turbine at Compressor Station 206 would exceed this level and are, therefore, subject to this rule and required to obtain an air quality permit. Transco filed its air permit application with the NJDEP on January 4, 2017.

- Permits and Certificates for Minor Facilities (NJAC 7:27-8.12): Requires newly constructed, reconstructed, or modified equipment and control apparatus requiring a permit per NJAC 7:27-8.2(c)1 to incorporate "advances in the art of air pollution control." The combustion turbines at Compressor Station 206 would be subject to this provision because the total emissions of NO_x, CO, particulate matter, and ammonia are greater than the 5 tpy threshold specified in the regulation. The Solar Mar turbines would be equipped with $SoLoNO_x$ dry low NO_x combustor technology and SCR to control NO_x emissions to levels as low as 5.5 ppm by volume at 15 percent oxygen. The proposed emission rates for NO_x and CO satisfy the state of the art requirements for these pollutants.

- NJAC 7:27-16, Control and Prohibition of Air Pollution by Volatile Organic Compounds, referred to as the VOC Reasonably Available Control Technology (RACT) Rule, applies to combustion turbines that are subject to the requirements of NJAC 7:27-19 (NO_x RACT Rule). The combustion turbines at Compressor Station 206 would be subject to the NO_x RACT Rule and therefore are also subject to the VOC RACT Rule. The turbines would meet the requirements of the VOC RACT Rule.

- NJAC 7:27-19, Control and Prohibition of Air Pollution from Oxides of Nitrogen, referred to as the NO_x RACT Rule, applies to the stationary combustion turbines at Compressor Station 206 because they would exceed the maximum gross heat input rate of at least 25 million British thermal units per hour specified in the rule. The NO_x emission rate for the turbines proposed for Compressor Station 206 would meet the applicable standard in this rule.

New Jersey maintains "state of the art" (SOTA) regulations which require new or modified air emissions equipment or control devices to incorporate state of the art control technology where criteria pollutants and HAPs emissions exceed thresholds identified in the NJAC Title 7, Chapter 27, Subchapter 8 – Appendix 1, Tables A and B. For criteria pollutants, the threshold is 5 tpy. The threshold for HAPs regulated in New Jersey are listed in Table B (provided in pounds per year). The turbines at Compressor Station 206 would meet SOTA requirements through its use of $SoLoNO_x$ and SCR. In addition, the CO emission rate of 15 parts per million by volume – dry (ppmvd) at 15 percent oxygen is below the 25 ppmvd by 15 percent oxygen level specified in the SOTA manual. These control technologies ensure that NO_x and CO emissions meet performance levels required by SOTA regulations.

4.10.1.4 General Conformity

The General Conformity Rule was developed to ensure that federal actions in nonattainment and maintenance areas do not impede states' attainment of the NAAQS. A General Conformity Determination must be conducted by the lead federal agency if a federal action's construction and operation activities are likely to result in generating direct and indirect emissions that would exceed the conformity applicability threshold level of the pollutant(s) for which an air basin is designated as nonattainment or maintenance. Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

The General Conformity Rule entails both an applicability analysis and a subsequent General Conformity Determination, if applicable. The EPA amended the General Conformity Rule in 2010 (Federal Register, Volume 75, Number 64) to exclude emissions regulated by any permit issued under minor and major NSR from a General Conformity applicability analysis; therefore, emissions from sources that are subject to NSR permitting/licensing (major or minor) are exempt and are deemed to have conformed, this includes operational emissions from Compressor Station 206. A General Conformity Determination must be completed when the total direct and indirect emissions of a project would equal or exceed the specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area. General Conformity does not apply to federal actions in attainment areas or unclassifiable/attainment areas, including counties designated attainment or unclassifiable/attainment that are within the Northeast OTR.

The EPA has designated the South Central Pennsylvania Intrastate AQCR, Metropolitan Philadelphia Interstate AQCR, and New Jersey-New York-Connecticut Interstate (NJ-NY-CT Interstate) AQCR as nonattainment areas for the 8-hour ozone standard and maintenance for $PM_{2.5}$. All non-permitted emissions associated with the Project that would occur within a nonattainment or maintenance area were considered in the General Conformity applicability analysis. Table 4.10.1-4 provides the estimated construction emissions for each component of the Project.

A federal General Conformity Determination is required for certain projects undertaken in the areas for which the combined direct and indirect emissions would equal or exceed the following thresholds (see 40 CFR § 93.153(b) and 30 TAC § 101.30):

- 100 tpy of NO_x or 50 tpy of VOC in marginal nonattainment areas for ozone; and
- 100 tpy of $PM_{2.5}$, SO_2, NO_x, or VOC in maintenance areas for $PM_{2.5}$.

As demonstrated in table 4.10.1-4, emissions of NO_x and VOC in Pennsylvania (South Central Pennsylvania Intrastate and Metropolitan Philadelphia Interstate AQCRs) would be below the General Conformity applicability thresholds; therefore, no further analysis is required in these locations. However, the Project portion in the NJ-NY-CT Interstate AQCR, which includes Compressor Station 206 and the Madison and Raritan Bay Loops, requires a federal General Conformity Determination because the combined direct and indirect emissions of NO_x would equal or exceed 100 tpy.

Per the General Conformity regulations, Transco intends to demonstrate conformance by fully offsetting the total direct and indirect emissions of the Project by reducing emissions of NO_x in the same nonattainment area. FERC worked closely with the EPA to review and comment on Transco's Air Quality Technical Report (AQTR), Construction Emission Tracking Plan (CETP), and Air Quality Mitigation Plan (AQMP).[35] The USACE determined that the Raritan Bay Loop must be buried with at least 15 feet of cover in federally maintained shipping channels and at least 7 feet of cover in designated anchorage area 28. The NYSDEC also requested that Transco utilize a clamshell dredge to install the Raritan Bay Loop between MPs 25.2 and 25.6 and MPs 33.5 and 33.9, rather than a jet trencher as originally planned. Transco revised its construction plans to comply with these requirements and, as discussed in section 4.5.2.8, continues to

[35] The AQTR and AQMP are included in Attachments A and B, respectively, in Transco's November 2, 2018 supplemental filing in Accession No. 20181102-5201. Transco's CETP is within appendix C of the AQMP.

consult with the USACE, NJDEP, and NYSDEC regarding the final volumes and offshore and onshore disposal locations of dredge material. Transco is continuing to consult with the NYSDEC regarding the potential to side-cast non-Class C sediments in anchorage area 28 (MPs 24.0 to 24.9) and between MPs 35.2 to 35.5. On November 2, 2018 Transco filed a revised AQTR, CETP, and AQMP based on the final USACE burial depth requirements, NYSDEC construction modification requests, and our October 23, 2018 environmental information request. The revised AQTR was used as the basis for the final General Conformity Determination included in appendix I.[36] The AQTR includes detailed estimates of the emissions that would occur under four scenarios that comply with USACE burial depth requirements and NYSDEC clamshell excavation requests, but vary depending on whether all or a portion of the dredge material would be approved for disposal in the HARS or at approved onshore facilities, and whether side-casting of dredge material in anchorage 28 and between MPs 35.2 and 35.5 is approved. FERC staff independently reviewed the AQTR, AQMP, and CETP and generally finds them acceptable, with some minor changes that staff recommend be included as conditions to any Commission authorization.

Table 3.1-1 in the General Conformity Determination (appendix I) provides the estimated construction emissions for Year 1 (2019) and Year 2 (2020) in the NJ-NY-CT Interstate AQCR for all four scenarios. Scenario 1, the most conservative scenario, assumes that use of the HARS and side-casting would be denied, and that all dredge material would be processed and disposed of at upland facilities in New Jersey. Scenario 1 would result in 721.8 tons of NO_x emissions in 2020, which exceeds the General Conformity applicability threshold of 100 tpy NO_x. The estimated NO_x emissions associated with the three other scenarios range from 679.7 tpy to 695.7 tpy. Transco has demonstrated that it could mitigate NO_x emissions for the worst-case scenario, Scenario 1, to ensure compliance with General Conformity regulations. However, Transco would be required to mitigate for the scenario that would occur during construction, in compliance with final determinations from the USACE and NYSDEC. Comments received on the draft General Conformity Determination, including those about included equipment and emissions assumptions, are addressed in the final General Conformity Determination.

As detailed in its AQMP, Transco pursued a direct offset mitigation strategy by sponsoring projects that would reduce air emissions in the NJ-NY-CT Interstate AQCR. Transco identified and ranked six projects from "low" to "high" based on their probability for use in offsetting NESE Project construction emissions. Our conformity analysis only considered the four mitigation projects with a high and medium probability of implementation prior to the start of construction in order to offset Project-related emissions, including the NJ Motor Trucking Association Port of New York and New Jersey Truck Replacement Program, Other Independent Trucking Companies using the Port Authority of New York and New Jersey Truck Replacement Program, NJ TRANSIT Bus Electrification Project, and the NJ TRANSIT Support Systems for New Dual Mode Locomotives Project.

Should the direct mitigation option fall short of offsetting all Project construction NO_x emissions in the NJ-NY-CT Interstate AQCR, Transco would purchase emissions reduction credits (ERC) or Creditable Emissions Reductions (CER) to offset the remaining NO_x emissions. Based on publicly available information on the NYSDEC and NJDEP websites, there are enough NO_x ERCs or CERs available for purchase to fully offset all construction emissions of NO_x for the NESE Project.[37] We received

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[36] The draft General Conformity Determination was issued with a 30-day comment period on September 18, 2018 in Accession No. 20180918-3031. A Notice of Availability for the document was mailed to the environmental mailing list for the NESE Project and was published in newspapers in the Project area. All substantive comments on the draft General Conformity Determination are addressed in the final General Conformity Determination included in appendix I and in the responses to comments in appendix M.

[37] Publicly available information on ERCs in New York State can be found at http://www.dec.ny.gov/chemical/8564.html. The ERC registry, available at http://www.dec.ny.gov/docs/air_pdf/ercsregistry.pdf, provides detailed information on ERCs.

comments indicating that at least two of Transco's proposed mitigation projects (the NJ Motor Trucking Association Port of New York and New Jersey Truck Replacement Program and Other Independent Trucking Companies using the Port Authority of New York and New Jersey Truck Replacement Program) may overlap with projects that the NYNJPA has already begun to implement or has committed to fund, suggesting that the emission credits associated with these projects may be double-counted if applied to the NESE Project. As discussed above, our conformity analysis considered the four mitigation projects with a high or medium probability of implementation prior to the start of construction, as described in our final General Conformity Determination, and we confirmed these have not yet been implemented or funded. In addition, as stated in its November 2, 2018 AQMP, the truck replacement programs that Transco proposes to sponsor would be separate from and in addition to the NYNJPA's existing truck replacement program. Further, Transco would be required to demonstrate that its mitigation projects would result in unique reductions and be implemented prior to construction; thereby avoiding double-counting of reductions. To ensure that Transco meets its mitigation obligations under General Conformity, the final General Conformity Determination includes a recommendation to receive confirmation that Transco's proposed mitigation projects are in place and/or ERCs and CERs have been purchased to offset all estimated construction emissions of NO_x.

Transco's AQMP includes a preliminary Mitigation Project Emissions Tracking Plan (MPETP)[38] to track, quantify, and verify that emissions reductions are achieved. In addition, as discussed in appendix I, Transco would implement its CETP to track actual construction emissions of NO_x, $PM_{2.5}$, and VOC within the NJ-NY-CT Interstate AQCR. To ensure that all appropriate agencies have the opportunity to review actual construction emissions and offsets generated by mitigation projects and to ensure that the final CETP and MPETP reflect all final agency decisions and represents the most accurate emissions scenario, the final General Conformity Determination includes recommendations for Transco to file final versions of its AQMP, CETP, and MPETP that specifically address the final scenario of estimated construction emissions for which Transco should mitigate, and to provide applicable tracking reports directly to contacts at the EPA, NYSDEC, and NJDEP on a monthly basis.

Prior to issuance of the draft EIS, we received comments indicating that the draft General Conformity Determination must be issued with the draft EIS. In support of this request, the commenters indicate that Transco was aware of its need to address General Conformity during pre-filing for the NESE Project. General Conformity is an independent review, separate from the NEPA review and responsibilities herein. While the General Conformity regulations include provisions such that the General Conformity Determination can be issued concurrent with the NEPA document (Environmental Assessment/EIS), there is no regulatory requirement within either of these programs that they must be issued concurrently. The EPA issued guidance that addresses the interface between NEPA and General Conformity (EPA, 1994). This document states that the General Conformity rule does not require linking the conformity determination with NEPA (EPA, 1994). The federal agency approving, funding, or permitting the federal action to which General Conformity applies, in this case FERC, may determine when it has sufficient information to proceed with a draft or final determination, with deference to any mandatory timing within the General Conformity rule. Further, the General Conformity rule includes its own provisions for public review and comment periods. As the Commission must comply with the General Conformity regulations, this EIS assumes a complete mitigation of applicable emissions. Also prior to issuance of the draft EIS we received comments indicating that Transco incorrectly assumed construction would occur during the months of January and July 2018. In its AQTR, Transco states that it uses the months of January and July (winter and summer months) to determine the most conservative emission factors for non-road vehicles in EPA's Motor Vehicle Emission Simulator (MOVES) program. Transco did not indicate that construction would occur only during this timeframe. Commenters also contended that the summary data included in

[38] The MPETP can be found in appendix D of Transco's AQMP filed November 2, 2018 (Accession No. 20181102-5201).

the AQTR does not match the raw data provided in the report; however, no specific supporting information was provided. On November 2, 2018, Transco filed a revised AQTR. We reviewed the report and did not find inaccurate or outdated information. Transco revised its emissions estimates based on publicly available comments from FERC, along with other federal and state agency feedback.

Based on our review of the NESE Project, estimated air emissions, and mitigation measures, and after consultation with EPA Region 2, the NJDEP, and the NYSDEC, the final General Conformity Determination concludes that the NESE Project will achieve conformity in New Jersey and New York through compliance with 40 CFR 93.158(a)(2) and 40 CFR 93.158(c).

4.10.1.5 Construction Impacts and Mitigation

Air emissions would be generated during construction of the proposed pipeline and aboveground facilities. Transco anticipates that construction would begin in the third quarter of 2019 and would continue through spring 2021 (restoration activities), with an anticipated in-service in late 2020. Transco proposes to typically construct 6 days per week (Monday through Saturday) from 7:00 a.m. to 7:00 p.m. for all onshore non-HDD construction activities. Section 2.4 identifies exceptions to the construction schedule that may include occasional extended hours for specific time-sensitive activities like valve tie-ins or hydrostatic testing. HDD activities would occur 24 hours per day until complete. Offshore construction activities would also typically occur 24 hours per day, 7 days per week. Project construction would result in temporary increases of air emissions from the use of diesel- and gas-fueled equipment and vessels, blowdown and purging activities, as well as temporary increases in fugitive dust emissions from earth/ roadway surface disturbance. Indirect emissions would be generated from vehicles and vessels associated with construction workers traveling to and from work sites both onshore and offshore. Construction air quality impacts would be short-term, lasting only during the period of active construction. Following construction, air quality would revert back to previous conditions.

Fugitive dust would result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. Emissions would be greater during dry periods and in areas of fine-textured soils subject to surface activity. The volume of fugitive dust generated would be dependent upon the area disturbed and the type of construction activity, along with the soil's silt and moisture content, wind speed, precipitation, roadway characteristics, and the nature of vehicular/equipment traffic. We received comments stating that fugitive dust should be controlled during construction of the Project. Transco would implement measures outlined in its Fugitive Dust Control Plan to limit fugitive dust emissions (see table 2.3-3).[39] Measures in this plan include, but are not limited to, application of water or other dust suppressant on unpaved surfaces, soil stockpiles, and workspaces; enforcing a 15-mph speed limit within construction sites and on unpaved roads; cleaning track-out on public roads in a timely manner; and restoration of disturbed areas as soon as practicable. We reviewed the Fugitive Dust Control Plan and find it acceptable.

Combustion emissions from commuter, on-road (e.g., delivery and material removal vehicles), and non-road construction vehicles, including marine and non-vessel offshore equipment, were estimated using the EPA MOVES model version MOVES2014a, which estimates emissions for on-road and non-road vehicles and equipment. Marine vessel emission factors were obtained using EPA's 2009 *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories*. Onshore emission-generating activities would include earthmoving, construction equipment exhaust, on-road vehicle traffic, and off-road vehicle traffic. Offshore emissions-generating sources include marine vessel and non-vessel engine exhaust from activities such as dredging, pumping, lighting, sediment and material transport, and crew transport, among others and include both marine vessels (e.g., tugboats, crew boats, clamshell/anchor barges) and non-marine equipment (e.g., pumps, generators, light plants, forklifts and cranes) which would

[39] The Fugitive Dust Control Plan was filed with Transco's FERC application on March 27. 2017 (Accession No. 20170327-5102 (Resource Report 1, appendix 1B, attachment 3).

not occur but for the Project. Construction emission estimates were based on a typical construction equipment list, hours of operation, and vehicle/vessel miles traveled by the construction equipment and supporting vehicles for the Project.

Table 4.10.1-4 provides current estimates of onshore and offshore construction emissions of criteria pollutants, HAPs and GHGs.[40] The emissions presented are from the worst-case emissions scenario, which assumes Transco would dispose of all dredge material at onshore sites and install the Raritan Bay Loop with 15 feet of cover at the Raritan Bay and Chapel Hill Channels and 7 feet of cover in designated anchorage area 28. Additional details regarding the scenario assumptions and associated emissions can be found in the final General Conformity Determination (appendix I).

Transco would mitigate fugitive dust emissions by implementing measures such as applying fugitive dust suppressants (e.g., water) on disturbed areas; covering open hauling trucks with tarps, as needed; and limiting vehicle speeds on construction sites. Onshore criteria pollutant emissions, including NO_x, would be limited by reducing engine emissions by use of low sulfur diesel, restricting engine idle times on site to 3 minutes, and requesting contractors to use construction equipment with engines meeting EPA Tier 4 onshore non-road emission standards or best available emission reduction technologies. Transco could minimize offshore engine emissions by enforcing idling time limits when possible; utilizing clean diesel through add-on technologies; using newer equipment, where available; and requesting contractors utilize equipment meeting EPA Tier 3 or higher non-road emissions standard or best available emission reduction technologies.

4.10.1.6 Operational Impacts and Mitigation

Operation of the Project would result in emissions associated with combustion of natural gas at Compressor Station 206 to operate the compressor units. There would also be leaks or “fugitive emissions” of natural gas along the pipeline (e.g., MLVs) and at aboveground facilities, as well as venting of natural gas from blowdown activities.

Pipeline

Pipeline emissions would be minimal during operations and would typically be limited to pipeline blowdowns and fugitive emissions at aboveground facilities, such as MLVs. Transco states that it operates under a Control Measures Plan in accordance with NJAC 7:27-16.21 to control potential VOC emissions associated with applicable blowdown events for its natural gas pipeline operations in the state of New Jersey. Control techniques that Transco implements under this plan include pipeline drawdown and recompression. Pipeline drawdown can be accomplished by allowing customer deliveries to reduce the pipeline pressure and thereby reduce the amount of gas released to the atmosphere during a blowdown event. Recompression involves a portable turbine or engine to withdraw gas from the section of pipeline being blown down, recompressing it, and injecting the gas into a pipe away from the isolated section. This further reduces the pressure in the isolated section of pipe and reduces the amount of gas blown down to the atmosphere.

[40] Detailed emission calculations were provided in Transco’s AQTR, filed November 2, 2018 (Accession No. 20181102-5201).

TABLE 4.10.1-4

Estimated Construction Emissions and General Conformity Applicability Thresholds

South Central Pennsylvania Intrastate AQCR (Quarryville Loop)			
Year	Pollutant	Construction Emissions (tons)	General Conformity Applicability Threshold (tpy)
Year 2 [a]	NO_x	59.4	100
	VOC	7.2	50
	$PM_{2.5}$	24.3	100
	SO_x	0.1	100
	PM_{10}	78.4	NA
	CO	50.0	NA
	CO_2e	15,479	NA
	HAPs	0.2	NA
Metropolitan Philadelphia Interstate AQCR (Compressor Station 200)			
Year	Pollutant	Construction Emissions (tons)	General Conformity Applicability Threshold (tpy)
Year 2 [a]	NO_x	17.8	100
	VOC	2.6	50
	$PM_{2.5}$	2.2	100
	SO_x	0.0	100
	PM_{10}	6.1	NA
	CO	26.1	NA
	CO_2e	4,764	NA
	HAPs	0.0	NA
NJ-NY-CT Interstate AQCR (Compressor Station 206, Madison Loop, and Raritan Bay Loop)			
Year	Pollutant	Scenario 1 (Worst Case) Construction Emissions (tons)	General Conformity Applicability Threshold (tpy)
Year 1	NO_x	1.8	100
	VOC	0.2	50
	$PM_{2.5}$	0.9	100
	SO_x	0.0	100
	PM_{10}	3.3	NA
	CO	0.9	NA
	CO_2e	564	NA
	HAPs	0.0	NA
Year 2	NO_x	721.8	100
	VOC	42.9	50
	$PM_{2.5}$	80.4	100
	SO_x	42.3	100
	PM_{10}	82.9	NA
	CO	459.5	NA
	CO_2e	79,116	NA
	HAPs	1.2	NA

[a] Estimated emissions in Year 1 within the South Central Pennsylvania Intrastate and Metropolitan Philadelphia Interstate AQCRs would be negligible and are not shown.

Operation of the Project pipelines would result in fugitive emissions of VOC, HAPs and CO_2e emissions. Potential annual emissions of these pollutants are estimated to be 0.0006 tpy of VOC, 3.4 x 10^{-7} tpy of HAPs, and 7.0 tpy CO_2e of GHGs.

Compressor Station 200

Commenters indicate that Transco omitted operation emissions from Compressor Station 200; however, the proposed compressor unit at Compressor Station 200 would be electric-driven (no combustion emissions) with minimal fugitive emissions, and no operational air permit (Plan Approval) is required. We received comments expressing concern with fugitive emissions from the modifications at Compressor Station 200, including construction of buildings and fugitive leaks from valves. Fugitive emissions resulting from the emergency generator, piping and valves at Compressor Station 200 are estimated at 299 tpy CO_2e GHG and 0.28 tpy of VOC.

Compressor Station 206

Compressor Station 206 would be the only source of permitted, long-term emissions for the Project. Transco would mitigate operational emission at the station by installing an SCR system to control NO_x emissions. The turbines would also incorporate $SoLoNO_x$ (i.e., dry low-NO_x or lean pre-mix). This technology incorporates low NO_x combustors to limit emissions of NO_x while limits emissions of CO. Finally, Transco would also employ an oxidation catalyst system to reduce CO and HAP emissions. Table 4.10.1-5 provides the annual emissions associated with operation of Compressor Station 206, based on manufacturer's specifications for the emission sources, anticipated operations, and site-specific conditions. Table 4.10.1-6 provides a detailed listing of HAP emissions associated with Compressor Station 206.

TABLE 4.10.1-5

Compressor Station 206 Potential Operational Emissions (tons per year)

	Emissions							
Source	NO_x	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$ [a]	Ammonia	Total HAPs [b]	CO_2e
Compressor Units	22.7	56.9	8.35	3.07	18.94	14.79	0.68	132,720
Condensate Tank	-	-	1.00	-	-	-	-	-
Emergency Generator	0.3	0.5	0.13	0.0002	0.004	-	0.02	53
Piping Fugitive Leaks	-	-	0.43	-	-	-	0.01	456
Blowdowns	-	-	0.26	-	-	-	0.00	2,914
Total Facility Emissions	**23.0**	**57.4**	**10.17**	**3.07**	**18.94**	14.79	**0.71**	**140,935**

[a] Emissions presented are per pollutant (e.g., 18.94 tpy for both PM_{10} and $PM_{2.5}$, individually)
[b] Formaldehyde would be the worst-case individual HAP at 0.35 tpy.

TABLE 4.10.1-6

Hazardous Air Pollutant Emissions for Compressor Station 206

Pollutant	Emissions (lb/hr)	Emissions (tons/yr)
HCHO3	0.08	0.34
1,3-Butadiene	0.0002	0
Acetaldehyde	0.01	0.044
Acrolein	0.00354	0.006
Benzene	0.0031	0.014
Ethylbenzene	0.008	0.034
Naphthalene	0.0004	0.002
Polycyclic aromatic hydrocarbon	0.0	0.0002
Propylene Oxide	0.0072	0.032
Toluene	0.0326	0.142
Xylenes	0.016	0.07

We received comments regarding blowdown frequency and emissions anticipated at Compressor Station 206. Estimated emissions from venting or blowdowns are described in table 4.10.1-5. Unplanned blowdowns may occur at the compressor stations in response to various unforeseen circumstances such as an electrostatic discharge event or during other abnormal or emergency operating conditions. Because these events rarely occur, emissions from emergency situations have not been accounted for in the table. The primary pollutant emitted during a blowdown is CH_4, a GHG, but other natural gas constituents, including ethane, propane, butane, pentane, and hexane, are also emitted. At compressor station facilities, blowdowns typically occur during start-up/shutdown (commissioning and decommissioning), for maintenance activities and, rarely, during emergencies. There are different types of blowdowns. A unit blowdown releases gas associated with a particular compressor unit and is achieved using valves to isolate a particular portion of the station and vent the gas. Transco states that these blowdowns would occur 5 to 6 times per year, on average, but typically depend on the unit's usage and maintenance requirements. Unit blowdowns typically last from 1 to 5 minutes. A station blowdown evacuates gas from the entire compressor station and is expected to occur during exercises to test the station's emergency procedures and during an actual emergency. Landowners would be notified in writing and police, fire, and local officials would be notified by phone about 1 week prior to planned blowdowns. In addition, Transco provides pre- and post-blowdown notifications to local officials as well as state and federal agencies, as applicable. These notifications provide estimated emissions, time and duration of the blowdown event, and information regarding temporary noise and odor levels in the area. Blowdown emissions from Compressor Stations 200 and 206 are estimated at 2,914 tpy CO_2e of GHG and 0.26 tpy of VOC.

Some commenters expressed concern about the potential for odors from Compressor Station 206, in particular in combination with a sewage treatment facility 2 miles from the proposed compressor station. The gas in the pipeline is odorized with a type of odorant allowed under DOT regulations 49 CFR 192.625. Odorants in gas can be a variety of chemicals but are typically mercaptans, -ethyl sulfides, or blends of these chemicals. Pipeline companies use these chemicals for detection of leaks because they are perceptible at extremely low ambient air concentrations. Most people are familiar with these chemicals at low concentrations as the "natural gas smell," even though CH_4 and pipeline quality natural gas typically have no odor. Transco would utilize deodorization facilities for planned blowdowns. A filter, typically an activated-carbon filter cartridge, would remove odorants from the natural gas. Generally, pipelines and compressor stations transporting odorized gas would not have significant odors from the odorants when operated properly although minor and temporary odors during deodorizer replacement and maintenance may occur.

We received several comments indicating that Transco should conduct an analysis of CH_4 leaks and exhaust emissions at its existing Compressor Station 515, which should then be used to inform the analysis of downstream emissions at Compressor Station 206. Transco provided a detailed emissions analysis and supporting information for Compressor Station 206, which includes emissions controls specific to Station 206, such as SCR. Because emissions estimates are specific to operational conditions (emissions reductions technologies and station design/configuration/mitigation), an analysis of Compressor Stations 515 for comparison purposes would not provide meaningful information for the NESE Project. Further, the Commission reviews each project on its own merit; therefore, we decline to require an analysis of Compressor Station 515.

Transco performed an ambient air quality modeling analysis to determine local impacts from Compressor Station 206. The modeling analysis was completed using the EPA's AERMOD dispersion model (Version 16216) in screening mode. Consistent with EPA guidelines, the modeling analysis does not include emergency or intermittent sources (e.g., emergency generator) due to the limited hours of permitted and actual operation. Transco used the MAKEMET processor to develop a screening meteorological dataset and provide conservative results. Table 4.10.1-7 provides the screening level air quality modeling results.

TABLE 4.10.1-7

Compressor Station 206 NAAQS Air Quality Modeling Results

Pollutant	Averaging Period	Maximum Project Model Concentration (μg/m³)	Ambient Background (μg/m³)	Total Concentration (μg/m³)	NAAQS (μg/m³)
CO	1-hour	62.4	2,748.0	2,810.4	40,000
	8-hour	56.2	2,061.0	2,117.2	10,000
NO_2	1-hour	25.0	84.6	109.6	188
	Annual	2.5	19.3	21.8	100
$PM_{2.5}$	24-hour	12.5	53.0	65.5	150
	Annual	2.1	8.0	10.1	12.0
PM_{10}	24-hour	12.5	19.7	32.1	150
SO_2	1-hour	3.4	21.8	25.2	195
	3-hour [a]	3.4	21.8	25.2	1,300
	24-hour	2.0	13.1	15.1	365
	Annual	0.3	1.7	2.0	80

[a] 3-hour background levels were not available and are conservatively assumed to equal 1-hour background.
μg/m³ = microgram per cubic meter.

Some commenters expressed concern regarding the modeling conducted to estimate operating emissions from Compressor Station 206. Specifically, some commenters contend that the representative air quality monitoring station in New Brunswick, New Jersey, may not work consistently and does not provide adequate exposure information for those living within 5 miles of Compressor Station 206. Other commenters were concerned that the air modeling averages emissions over time, and does not account for emission variations that may occur on a short-term basis. Transco conducted modeling in accordance with state (NJDEP) and federal (EPA) guidelines and the results indicate that Compressor Station 206 would not violate the NAAQS. In addition, the results of the screening analysis indicate that the maximum modeling concentrations of criteria pollutants would not contribute to an exceedance of the NAAQS. Further, Transco used air quality data from EPA-approved monitors managed by state and/or tribal agencies that are near the Project facilities or are representative of the surrounding air quality, as required by EPA. Compressor station emissions are evaluated based on continuous peak exposure (the station's potential to emit), and not averages as suggested, which provides a conservative exposure scenario. Thus, table 4.10.1-7 discloses a worst-case emissions scenario for Compressor Station 206.

4.10.1.7 Additional Air Quality Comment Responses

We received a comment requesting that we require Transco to provide emissions for toluene, benzene, CH_4, and lead at Compressor Station 206. This information was provided in Transco's application (Resource Report 9, appendix 9B) and the results are as follows: toluene (7.14×10^{-2}), benzene (6.59×10^{-3}), CH_4 (33.41 tpy of CO_2e). No lead would be emitted from Compressor Station 206. Commenters also expressed concern with VOC emissions and toxic compounds in natural gas. While the term "VOC" can, under specific circumstances, refer to highly toxic compounds, VOCs in transmission quality natural gas are limited to butane, propane, pentane, and hexane.

Fugitive gas emissions can occur due to leaks from gas pipeline equipment such as tie-ins, valves, and regulator stations. Fugitive gas can also be emitted from blowdowns at compressor stations. These emissions have been estimated for Compressor Station 206 as shown in table 4.10.1-5. Fugitive VOC emissions from equipment leaks and blowdowns, combined, are estimated to be less than 1 tpy. These fugitive gas emissions would be pipeline quality gas that is primarily comprised of CH_4, ethane, and propane (hydrocarbons), and not highly toxic compounds. Transco's transmission-quality gas composition is provided in table 4.10.1-8. Hexane is the only gas component that is a listed HAP and is present in only trace amounts. Transco publishes its gas quality data on its publicly accessible "1Line Portal."[41] Transco's gas quality would remain within the limits of its FERC Gas Tariff after construction of the NESE Project. Failure to meet tariff restrictions can cause damage to transmission compressors transporting poor-quality gas or downstream equipment combusting the natural gas.

TABLE 4.10.1-8

Transco's Transmission Pipeline Gas Composition at Compressor Station 200

Component	Percent Composition
Nitrogen	0.265
CO_2	0.051
CH_4	97.291
Ethane	2.296
Propane	0.087
i-Butane	0.003
n-Butane	0.006
i-Pentane	0.0
n-Pentane	0.0
Hexane+	0.001
C5+	0.001

Numerous commenters expressed concern with public health impacts resulting from operational and intermittent blowdown emissions of GHGs, HAPs, and criteria pollutants in populated areas. Commenters expressed concern over health impacts on humans, including children and sensitive populations. These commenters requested that FERC conduct a health impact assessment. As demonstrated in table 4.10.1-5, full-capacity upper-bound (i.e., the station's potential to emit) emissions from Compressor Station 206 would be less than the NAAQS, which were established to protect human health (including sensitive subpopulations such as children or those with chronic illnesses) and public welfare. As described above, Compressor Station 206 would employ air pollution control measures to reduce NO_x, CO, and HAP emissions, and would be considered a minor source of air emissions under federal programs (e.g., NSR and Title V). A health impact assessment for a facility of this size and impact is not warranted.

We received comments requesting that Transco provide continuous air quality monitoring at Compressor Station 206. Transco would receive an air quality permit for Compressor Station 206 from the

[41] Transco's 1Line Portal can be accessed at http://www.1line.williams.com/Transco/index.html.

NJDEP. These permits carry monitoring and reporting requirements. Transco would comply with all applicable requirements of its air permit.

Several comments were received requesting that waste heat recovery be considered for Compressor Station 206. Waste heat recovery refers to energy in the form of heat that is ultimately discharged to the atmosphere. In natural gas transmission facilities, this heat is typically the result of exhaust released during the combustion phase of a compression cycle. In natural gas transmission systems, at least 15,000 hp of compression is necessary to effectively recover waste heat (INGAA, 2008). In addition, the location of the compression facilities is considered (e.g., proximity to the electrical grid) in determining the viability of waste heat recovery. To be economically viable, the INGAA estimates that compressor stations should operate more than 5,250 hours per year at or above 60 percent load over the previous 12 months (INGAA, 2008). An aboveground waste heat recovery system at Compressor Station 206 would likely require a power purchase agreement with a utility if the electricity generated could not be used onsite and would result in additional environmental impacts above the proposed activities (e.g., increased site development requirements and visual and noise impacts). While Compressor Station 206 would qualify for onsite waste heat recovery based on INGAA standards, the operational history of the station has not been determined. We acknowledge that there would be some environmental benefit to incorporating waste heat recovery at Compressor Station 206; however, we do not find that the use of waste heat recovery at Compressor Station 206 would provide a significant advantage over the proposed NESE Project.

We received comments indicating the emissions from Compressor Station 206 would impact vegetation, crops, and surface waters due to pollutant deposition on these resources. The EPA established the NAAQS to address human health and public welfare. The primary NAAQS standards provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. The secondary NAAQS standards provide public welfare protection, including protection against decreased visibility, economic interests, and damage to animals, crops, vegetation, and buildings. Nitrogen and ozone could impact crops and waterbodies. The EPA regulates ozone emissions by limiting emissions of NO_x and VOCs, which react in air to form ozone. In addition to being a minor source of emissions under federal air permitting programs (i.e., NRS, Title V, and NESHAPs), Transco's air quality modeling results demonstrate that Compressor Station 206 would meet the NAAQS. Therefore, we conclude that there would be no significant impact from air emissions on crops and waterbodies.

We received comments about the potential exposure to radon from the use of natural gas. We have previously evaluated general background information, studies, and literature on radon in natural gas in several past project EISs.[42] These studies include samples taken at well sites, pre-processing, post processing, and transmission pipelines, and the recent PADEP's Technologically Enhanced Naturally Occurring Radioactive Materials Study Report issued in January 2015 (PADEP, 2016b). This PADEP report is consistent with past studies, which identifies a median indoor radon concentration of 0.04 picocuries per liter and a maximum indoor increase of 0.13 picocuries per liter due to natural gas use. The EPA has set the indoor action level for radon at 4 picocuries per liter. If concentrations of radon are high enough to exceed these activity levels, the EPA recommends implementing remedial actions, such as improved ventilation, to reduce levels below this threshold. Further, the Indoor Radon Abatement Act established the long-term goal that indoor air radon levels be equal to or better than outdoor air radon levels. The average home in the United States has a radon activity level of 1.3 picocuries per liter, while outdoor levels average approximately 0.4 picocuries per liter. Past studies demonstrate that indoor radon concentrations from Marcellus Shale sourced gas would remain below the EPA action level and the Indoor

[42] New Jersey-New York Expansion Project Final EIS (Docket No. CP11-56) issued March 2012; Rockaway Delivery Lateral and Northeast Connector Projects Final EIS (Docket Nos. CP13-36 and CP13-132) issued February 2014; and the Algonquin Incremental Market Project Final EIS (Docket No. CP14-96) issued January 2015.

Radon Abatement Act long-term goal. Therefore, we find that the risk of exposure to radon in natural gas is not significant.

We received comments regarding the impact of high temperature, high velocity natural gas exhaust from Compressor Station 206 on birds. These comments are addressed in section 4.5.1.1.

4.10.1.8 Conclusions

Construction and operation of the Project would result in increased emissions in the Project areas. Transco would be required to comply with various state and federal regulations, which include construction and operating permits for applicable facilities. During construction of the Project, pollutants would be emitted from construction vehicles and equipment and fugitive dust would be generated from earth moving activities. Residents in the immediate vicinity of construction areas may temporarily experience dust and emissions during the anticipated 10 months of onshore construction. Transco would mitigate construction air quality impacts by implementing its Fugitive Dust Control Plan, using construction equipment with engines meeting EPA Tier 4 non-road emission standards or best available emission control technology, using low sulfur fuel in non-road construction equipment and vessels, and limiting idling to 3 minutes or less, among other measures. The largest share of construction emissions would be generated from activities associated with the offshore Raritan Bay Loop. As a result of the General Conformity process, all Project construction emissions of NO_x (the principal pollutant emitted during construction) in the NJ-NY-CT Interstate AQCR would be offset by direct mitigation of other sources of NO_x or through the purchase of ERC or CERs. Based our analysis and the short-term, temporary nature of construction, we conclude that construction of the Project would not have a significant impact on air quality.

During operation of the Project, the majority emissions would occur from the combustion of natural gas in the compressor units at Compressor Station 206. There would be no appreciable increase in long-term air emissions associated with Compressor Station 200. Compressor Station 206 would be considered a minor source of air emissions under federal and state air permitting programs, and the associated pollutant concentrations would be below the NAAQS, established to protect human health and public welfare. Transco would install an SCR system, $SoLoNO_x$ technology, and an oxidation catalyst to reduce emissions of NO_x, CO, and HAPs at Compressor Station 206, thereby minimizing air quality impacts.

We conclude that the construction and operation of the Project would not result in significant impacts on air quality.

4.10.2 Noise

Construction and operation of Project would affect overall noise levels in the Project area. The ambient sound level of a region is defined by the total noise generated within the specific environment and is comprised of natural and man-made sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetation cover.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the L_{dn}. The L_{eq} is a sound level over a specific time period corresponding to the same sound energy as measured for an instantaneous sound level assuming it is a constant noise source. Sound levels are perceived differently, depending on the length of exposure and time of day. The L_{dn} takes into account the time of day and duration the noise is encountered. Specifically, in calculation of the L_{dn}, late night and early morning (10:00 p.m. to 7:00 a.m.) noise exposures are increased by 10 dBA to account for people's greater sensitivity to sound during nighttime hours. Due to the 10 dBA nighttime penalty added prior to calculation of the L_{dn}, for a facility to meet the 55 dBA L_{dn} limit established by the EPA to protect the public from indoor and outdoor activity interference, the facility must be designed such that the constant 24-hour noise level does not exceed an L_{eq} of 48.6 dBA at any NSA. The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies.

Table 4.10.2-1 demonstrates the relative dBA noise levels of common sounds measured in the environment and industry. As a point of reference, a person's threshold of perception for a noticeable change in loudness is about 3 dBA, whereas a 5 dBA change is clearly noticeable, and a 10 dBA change is perceived as twice as loud.

TABLE 4.10.2-1

Sound Levels (dBA) and Relative Loudness

Description of Sound	Sound Level (dBA)
Threshold of pain	140
Jet taking off (200-foot distance)	130
Operating heavy equipment	120
Night club with music	110
Construction site	100
Boiler room	90
Freight train (100-foot distance)	80
Classroom chatter	70
Conversation (3-foot distance)	60
Urban residence	50
Soft whisper (5-foot distance)	40
North rim of Grand Canyon	30
Silent study room	20
Threshold of hearing (1,000 hertz)	0

Adapted from the OSHA, 2013.

4.10.2.1 Noise Regulatory Requirements

Federal Regulations

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and used it to evaluate to potential noise impacts from the proposed Project at pre-existing NSAs such as schools, hospitals, and residences. In addition, Commission regulations state that operation of compressor stations may not result in any perceptible increase in vibration at any NSA.

State and Local Regulations

<u>Pennsylvania</u>

There are no known Pennsylvania state noise regulations applicable to the Project. The Township of East Whiteland, where Compressor Station 200 is located, has a noise ordinance that states that no person, firm, or business shall operate a machine or device that equals or exceeds the following sound level at any adjacent property boundary: (a) 10 dB greater than the background noise level; or (b) 65 dBA from 7:00 a.m. to 9:00 p.m. (daytime hours) or 60 dBA from 9:00 p.m. to 7:00 a.m. (nighttime hours).

New Jersey

NJAC 7:29 states that the continuous airborne sound at the receiving residential property line shall not exceed 65 dBA during the daytime (7:00 a.m. to 10:00 p.m.) and 50 dBA during the nighttime (10:00 p.m. to 7:00 a.m.). In addition, the continuous airborne sound at an industrial or commercial property line shall not exceed a sound level of 65 dBA during any time, day or night.

New York

There are no known New York State noise regulations applicable to the Project. Title 15 of the Rules of the City of New York, Chapter 28, "Citywide Construction Noise Mitigation," establishes standard procedures to reduce noise levels from construction and standards for specific noise sources, including a construction noise mitigation plan (to be conspicuously posted at the site); operation of construction tools and equipment at normal manufacturer's operating specifications; mitigation measures for specific types of construction equipment; and specifications for perimeter noise barriers for construction sites. In addition, equipment may be used only during the hours of 7:00 a.m. to 7:00 p.m., 6 days per week, unless an after-hours work authorization is obtained, in which case the equipment shall be used in accordance with the hours specified in the permit and in the after-hours work authorization.

According to the City of New York's City Environmental Quality Review Technical Manual, if a substantial stationary source noise generator is within approximately 1,500 feet of a receptor and there is a direct line-of-sight between the receptor and the generator, further analysis may be needed. If the noise from a stationary source at any receptor site would exceed 45 dBA, then a detailed analysis will be necessary. An increase in noise of 3 dBA $L_{eq}(1)$ above the existing background noise level during nighttime is considered significant. The $L_{eq}(1)$ is the 1-hour equivalent sound level for noise that fluctuates over time.

Transco anticipates that noise construction and operational noise levels would not exceed state or local requirements.

4.10.2.2 Impacts and Mitigation

Transco's noise consultant, Hoover and Keith, Inc., conducted noise surveys for HDD construction activities and operation of Compressor Stations 200 and 206. Daytime and nighttime HDD noise levels were measured at the nearest NSAs in December 2016 (leaf-off conditions). In addition, the A-weighted L_{eq} and unweighted octave-band sound pressure levels were measured. In instances where the nighttime noise levels (L_d) were not measured, they were estimated using the measured L_d and site observations to obtain a representative level where nighttime levels differ from daytime based on surrounding conditions (e.g., less vehicle traffic noise). Estimated noise from the entry/exit HDD equipment and activities were then combined with the ambient noise to determine the potential noise increase at the nearest NSAs during construction. There would be no HDD noise impacts during operation of the NESE Project.

For existing Compressor Station 200, existing noise levels were obtained from the most recent noise survey for the station, completed on December 23, 2009. The existing station noise levels were combined with the estimated noise level from the proposed equipment to determine the station's overall noise level at the nearest NSAs and the increase associated with the NESE Project. For proposed Compressor Station 206, the daytime and nighttime noise was measured at the nearest NSAs on January 31 and February 1, 2017. The A-weighted L_{eq} and unweighted octave band sound pressure levels were measured 5 feet above the ground. Hoover and Keith, Inc. excluded extraneous sounds, such as vehicles passing by or other intermittent sounds to get an accurate noise level measurement at the NSAs. Noise reduction and attenuation due to mitigation measures, atmospheric sound propagation (noise reduction with distance) and absorption, and shielding from buildings were subtracted from the unweighted octave band power levels, in dB. Noise reductions from trees/vegetation and land topography/contours were not included in the analysis. The ambient noise levels were combined with the estimated noise levels from the station equipment to provide the noise levels at the nearest NSAs and the increase above the existing ambient noise level in the area.

The methods used to measure and estimate noise levels for the NESE Project are industry standard and widely accepted. The detailed noise analysis for HDD activities and construction and operation of Compressor Stations 200 and 206 operations were included in Transco's application. In addition, in response to our request May 11, 2017 data request, Transco filed an updated noise survey for Compressor Station 200 that includes recent modifications from the New York Bay Expansion Project at Compressor Station 200.[43] We reviewed this analysis and agree with the methods and findings.

Construction Noise

Noise would be generated during construction of the Project. Noise levels would be highest in the immediate vicinity of construction activities and would diminish with distance from the work area. Construction activities associated with the onshore facilities would be performed with standard heavy equipment such as track-excavators, backhoes, cranes, bulldozers, dump trucks, boring equipment, and cement trucks. In addition, various powered pumps would be used to control water in the workspace or during hydrostatic testing activities. Noise would also be generated by trucks and other light vehicles traveling in and near areas under construction. Construction noise would be variable because of the types of equipment in use at a construction site change with each construction phase and activity. Noise from construction activities may be noticeable at nearby NSAs; however, onshore construction equipment would be operated on an as-needed basis and would be localized and short-term. Further, Transco would generally limit construction activities to 7:00 a.m. to 7:00 p.m., Monday through Saturday, with the exception of HDD operations.

Surface topography, vegetation cover, wind, and weather conditions would also affect the distance that construction-related noise would extend from the workspace. Tall, dense vegetation and rolling topography typically attenuates noise when compared to less vegetated, open land. Typically, the most prevalent sound source during construction would be the internal combustion engines used to power the construction equipment. Table 4.10.2-2 provides estimated noise levels at 50 feet from the source for typical construction equipment.

[43] FERC Docket No. CP17-101, Accession No. 20170601-5277.

TABLE 4.10.2-2 **Noise Levels of Major Construction Equipment** [a]	
Equipment Type	Sound Level at 50 Feet (dBA)
Trucks	85
Crane	85
Roller	85
Bulldozers	85
Pickup Trucks	55
Backhoes	80
Grader	85
Portable generators	84
Jackhammer	89
Pumps	81
Horizontal Boring Hydraulic Jack	82

[a] Federal Highway Administration, 2006.

Pipeline Construction

For the Quarryville and Madison Loops, construction equipment noise levels would typically be about 85 dBA at 50 feet when equipment is operating at full load, which could be heard by people in nearby buildings. However, most pipeline construction noise would be localized. Transco would construct its pipelines during daytime hours (7:00 a.m. to 7:00 p.m.). Some discrete activities (e.g., hydrostatic testing, tie-ins, and purge and packing the pipeline) may require 24 hours of activity for limited periods of time, as would HDD operations (see below). However, these activities would be short-term. Due to the temporary, transitory, and localized nature of pipeline construction, we conclude that pipeline construction noise would not have a significant impact on nearby landowners.

Commenters expressed concern with construction noise impacts on construction workers and wildlife. Transco and its contractors would adhere to OSHA regulations found at 29 CFR 1926 to ensure a safe working environment. Section 1926.52, Occupational Noise Exposure, specifically addresses construction-related noise. During construction, mobile wildlife species would likely relocate away from the construction area to avoid the noise. Immobile species would be impacted; however, noise at any given location would be localized and temporary. Once construction is complete, noise levels would return to preconstruction levels and wildlife would re-inhabit the area. The impact of construction noise on onshore wildlife species is discussed in more detail in sections 4.5.1.1 and 4.5.1.2.

We received comments expressing concern about Compressor Station 206 construction noise impacts on the NJBVMC. Existing facilities at the meditation center, including the Samadhi Buddha statue, would be about 0.3 mile from the nearest construction work area at the compressor station site, and the intervening area is wooded, which would reduce construction noise levels at the meditation center. The NJBVMC is planning to construct a meditation trail through the forested area of the meditation center property, and this trail would be closer to the construction work space. Based on the NJBVMC plan, the nearest construction activity, associated with the compressor station inlet and outlet pipelines, would be about 450 feet from the meditation trail. Construction noise levels at the meditation trail during earthwork, typically the loudest activities during construction, are estimated to be approximately 50 dBA, or approximately 48 dBA L_{dn} as construction would occur during daytime hours (7:00 a.m. to 7:00 p.m.). As indicated in table 4.2.10.1, this level of noise would be similar to the noise within an urban residence, and would diminish with distance from the Compressor Station 206 site. As discussed in section 4.7.5.1, construction of the meditation trail is scheduled for the second quarter of 2019 and would be completed when construction of Compressor Station 206 starts in the third quarter of 2019. Construction of the compressor station would be finished during the third quarter of 2020. Thus, users of the meditation trail could experience construction related noise for up to 15 months.

Construction noise associated with offshore activities would include the offshore HDD operations, marine vessel engines, and pile driving. Offshore activities would occur in an area that currently sustains substantial marine vessel traffic, and noise from offshore construction activities would be similar in nature to existing noise levels experienced in the area. Also, the Raritan Bay Loop would be in an offshore environment, largely separated from the public. Noise impacts on offshore wildlife species are discussed in sections 4.5.2.8 and 4.5.3.2.

<u>HDD Installations</u>

Transco would use the HDD method at seven locations (see table 2.3.2-1). The HDD method would be used to install three segments of the Madison Loop; two HDDs would be used to install the CP system associated with the Raritan Bay Loop; one HDD would be used to install the Raritan Bay Loop beneath the New Jersey shoreline; and the remaining HDD would be used to install the Raritan Bay Loop beneath the Ambrose Channel. HDD operations would generate noise at drill entry and exit points. Active HDD activities in any one area could last from 1 to 47 days, depending on the length of the drill and the hardness of the substrate being drilled.

Typical equipment used at HDD entry sites includes:

- drilling rig and engine-driven hydraulic power unit;
- engine-driven mud pumps and generator sets;
- mud mixing/cleaning equipment;
- fluid system shale shaker;
- mobile equipment including a crane, backhoe, and front loader; and
- engine-driven light plants.

Noise associated with HDD exit sites could result from use of the following equipment:

- engine-driven generator set;
- backhoe, side boom, and trucks;
- small engine driven pump;
- electric-driven generator set; and
- engine-driven light plants.

Transco proposes to implement various measures at HDD sites where the noise level could potentially exceed FERC requirements (Mitigation Measures 1, 2, and 3, which are defined below). The anticipated noise levels due to onshore HDD operations with mitigation measures are provided in table 4.10.2-3. Figures J-1 through J-6 in appendix J depict the nearest NSAs to the proposed HDD entry and exit sites. The Ambrose Channel HDD (a water to water drill) would take approximately 34 days to complete. There are no NSAs within 1 mile of the Ambrose HDD.

TABLE 4.10.2-3

Estimated Noise Levels (dBA) for the Onshore Horizontal Directional Drills

HDD Location	Entry/Exit Site and Nearest NSA	Duration (days)	Distance and (Direction) of Nearest NSA (feet)	Ambient L_{dn}	L_{dn} for Proposed HDD	Total L_{dn} (Ambient plus HDD)	Potential Increase	Mitigation Measures [a]
Cheesequake Road HDD (Madison Loop)	Entry – NSA 2	21	760 (S)	58.8	51.8	59.6	0.8	3
	Exit – NSA 1		790 (NNE)	55.2	49.9	56.3	1.1	-
Parkwood Village HDD (Madison Loop)	Entry – NSA 1	25	140 (NW)	52.7	54.5	56.7	4.0	1, 2
	Exit – NSA 2		450 (S)	75.1	53.5	75.1	0.0	-
Lockwood Marina HDD (Madison Loop)	Entry – NSA 1	20	440 (W)	59.0	53.9	60.2	1.2	1, 3
	Exit – NSA 2		130 (N)	56.7	53.9	58.5	1.8	3
Short CP Power Cable HDD (onshore)	Entry [b] – NSA 1	7	140 (N)	65.3	54.3	65.6	0.3	1, 3
	Exit – NSA 2		150 (SE)	67.9	52.2	68.0	0.1	3
Morgan Shore Approach HDD (Raritan Bay Loop)	Entry – NSA 1	47	140 (SW)	67.9	54.2	68.1	0.2	1, 2
	Exit		2,140 (SW)	65.3	39.6	65.3	0.0	-
Long CP Power Cable HDD (onshore to offshore)	Entry [b] – NSA 2	14	140 (N)	65.3	54.3	65.6	0.3	1, 3
	Exit – NSA 2		1,270 (SW)	52.4	45.1	53.1	0.7	-

[a] Mitigation Measures 1, 2, and 3 are defined below.
[b] Smaller drill rig employed at this site.

The mitigation measures listed in table 4.10.2-3 that would be implemented include:

- Mitigation Measure 1
  - Install a partial noise barrier or enclosure around the hydraulic power unit and engine-driven pumps by covering the sides of the equipment with an acoustically lined plywood barrier system or sound-absorptive/barrier material with a minimum sound transmission class 20–31 rating;
  - Employ a partial noise barrier around any engine jacket-water coolers; and/or
  - Install a partial barrier or partial enclosure around the mud mixing/cleaning system.
- Mitigation Measure 2
  - Cover the entry side workspace with a large acoustically lined tent (identified as a “noise-reducing tent”) designed with sound-absorptive/barrier liner material.
- Mitigation Measure 3
  - Employ a temporary noise barrier at the HDD exit workspace (between site equipment and the NSAs), since an exit site includes mostly mobile operating equipment.

Some additional mitigation measures that are available to Transco, if necessary, include:

- using residential-grade exhaust silencers on all engines in conjunction with any of the site HDD equipment (e.g., generators and pumps);
- using low-noise generators, which are designed with a factory-installed enclosure; and
- installing a temporary noise barrier (for example, 16 feet in height) around the entry site workspace. Typically constructed of 0.75-inch-thick plywood panels or constructed of a sound-absorptive/barrier.

As discussed above, the HDD noise levels presented in table 4.10.2-3 include mitigation where noted. In locations where mitigation would be installed, the unmitigated noise levels would otherwise exceed 55 dBA L_{dn}. Employing the mitigation measures outlined above would reduce the noise attributable to HDD equipment and activities to below 55 dBA. Further, the overall noise increase at each site would be less 10 dBA. HDD operations would be relatively short-term (1 to 3 months) and noise levels would return to preconstruction conditions after the pipelines and cable are installed. With implementation of the proposed mitigation measures, we conclude that the estimated noise from HDD operations would not result in a significant impact on nearby NSAs.

To ensure that the actual noise from HDD activities where mitigation is required is consistent with our estimates, **we recommend that:**

- **Transco should file in the <u>weekly construction status reports</u> the following information for HDD sites requiring noise mitigation:**

  a. the noise measurements from the nearest NSAs, obtained at the start of drilling operations;

  b. the noise mitigation that Transco implemented at the start of drilling operations; and

  c. any additional mitigation measures that Transco would implement, for review and written approval by the Director of OEP, if the initial noise measurements exceeded an L_{dn} of 55 dBA at the nearest NSA and/or increased noise is greater than 10 dBA over ambient conditions.

<u>Offshore Construction</u>

Noise would be generated from offshore construction. The primary sources of noise would be marine vessels, such as tugs and barges, dredging activities, pile-driving, and HDD operations. Construction would occur 24 hours per day, 7 days per week until complete. Most offshore construction would occur more than 1 mile from the shoreline and within the Raritan Bay waters; therefore, impacts on NSAs would not be significant. Impacts of pile driving and marine traffic (e.g., engine noise and physical contact) on aquatic species is addressed in section 4.5.2.8.

Operational Noise

The operational noise impact evaluation for the Project considers the noise produced by all sound-generating sources associated with the proposed and modified compressor stations that could impact the sound contribution at nearby NSAs. Sound sources include the turbine-driven compressor units, gas cooling equipment, and aboveground gas piping at each station. The noise analysis incorporates noise level reductions from Transco's proposed mitigation measures for Compressor Stations 200 and 206. Measures specific to a station are shown in parentheses. These measures include, but are not limited to:

- exhaust silencers (Compressor Station 206);
- air intake cleaner/silencers (Compressor Station 206);
- electric motor air inlet/outlet silencers (Compressor Station 200);
- noise attenuating materials for wall, roof, and doors of compressor buildings;
- wall ventilation air inlet and discharge mufflers;
- acoustical insulation for aboveground piping; and
- unit blowdown silencers (60 dBA at 300 feet).

Tables 4.10.2-4 and 4.10.2-5 provide the estimated noise impact at the nearest NSAs due to the full load operation of Compressor Stations 200 and 206, respectively. Figures J-7 and J-8 in appendix J depict the nearest NSAs to Compressor Stations 200 and 206, respectively.

TABLE 4.10.2-4

Operational Noise Impact Results for Compressor Station 200 (dBA)

NSA/Receptor	Distance and (Direction) of Nearest NSA (feet)	Existing Measured L_{dn} (Ambient + Existing Station)	L_{dn} for Compressor Station 200 Modifications	Total L_{dn} (Existing plus the Compressor Station 200)	Potential Increase
NSA 1 (Residences on Cameron Court)	1,000 (S)	53.6	38.8	53.7	0.1
NSA 2 (Residences on Kingston Circle)	450 (W)	52.0	41.9	52.4	0.4
NSA 3 (Residences on Elliston Court)	600 (SW)	52.4	40.4	52.7	0.3
NSA 4 (Residences on N. Bacton Hill Road at Old Valley Road)	1,700 (N)	52.2	38.5	52.4	0.2

Note: Estimated noise levels include mitigation measures.

TABLE 4.10.2-5

Operational Noise Impact Results for Compressor Station 206 (dBA)

NSA/Receptor	Distance and (Direction) of Nearest NSA (feet)	Existing Measured L_{dn}	L_{dn} for Proposed Compressor Station 206	Total L_{dn} (Existing plus Compressor Station) 206)	Potential Increase
NSA 1 (Residences on Carroll Place)	2,500 (W)	46.4	39.0	47.1	0.7
NSA 2 (Residences on County Road 518)	2,650 (NW)	46.4	38.7	47.1	0.7
NSA 3 (Meditation Center and Residences on Route 27 and Old Rd)	2,610 (ESE)	48.2	38.5	48.6	0.4

Note: Estimated noise levels include mitigation measures.

During the most recent interim post-construction noise survey for Compressor Station 200 as part of the New York Bay Expansion Project (Docket No. CP15-527), [44] the station was operating at 74 percent of full load. A full load survey is anticipated during the upcoming winter season. The noise levels provided include ambient noise and station noise, combined. Based on the current post-construction noise survey results, we anticipate the noise attributable to Compressor Station 200 would remain below an L_{dn} of 55 dBA after construction of the modifications under the NESE Project.

Noise attributable to the Compressor Station 200 modifications would be below 55 dBA L_{dn}, and the overall noise levels would remain below 55 dBA L_{dn}. To ensure that noise levels due to operation of Compressor Station 200 are consistent with the modeling estimates, **we recommend that:**

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing the new equipment at existing Compressor Station 200 in service. If a full load condition noise survey is not possible, Transco should instead file an interim survey at the maximum possible horsepower load and file the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at the modified Compressor Station 200 under interim or full horsepower load exceeds 55 dBA L_{dn} at any nearby NSA, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. Transco should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

We received numerous comments expressing concern for the operational noise associated with Compressor Station 206, including at the NJBVMC. As demonstrated in table 4.10.2-5, the estimated noise associated with Compressor Station 206 would range from 0.4 dBA to 0.7 dBA at the nearest NSAs, which is below the threshold of perception for the human ear (3 dBA). Ambient noise was measured at the Samadhi Buddha statue at the NJBVMC and was combined with the estimated station noise to determine overall impacts. The noise increase above the existing ambient noise near the Samadhi Buddha statue would be 0.4 dBA. Commenters were also concerned about noise impacts on the meditation trail that is proposed for construction at the NJBVMC in 2019. The estimated operational noise at the nearest point on the meditation trail to the compressor building (about 1,225 feet away) would be 46.8 dBA L_{dn}, which would comply with our operating noise requirements at NSAs of 55 dBA L_{dn}.

We received comments that Transco should provide continuous noise monitoring and provide various assessments regarding noise attenuation and effectiveness of mitigation (such as tree screening and silencers), among other things. As previously stated, Transco's noise consultant conducted a detailed noise analysis that indicates that the noise from Compressor Station 206 would be below 55 dBA L_{dn} at nearby NSAs. Further, Transco must demonstrate that Compressor Station 206 would comply with FERC noise requirements. To ensure that noise levels due to operation of the proposed compressor station are consistent with the modeling estimates, **we recommend that:**

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing Compressor Station 206 in service. If a full load condition noise survey is not possible, Transco should instead file an interim survey at the maximum possible horsepower load and file the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at the station under interim or**

[44] The post-construction noise survey for Compressor Station 200 under the New York Bay Expansion Project is available on the FERC eLibrary website under Docket No. CP15-527, Accession Nos. 20180504-5168, 20180504-5169.

full horsepower load exceeds 55 dBA L_{dn} at any nearby NSA, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. Transco should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.

In addition to normal operational noise, there may also be sources of noise due to maintenance or emergency operation. Specifically, emergencies and maintenance activities involve blowdowns, which is a process of depressurizing/emptying station equipment to remove natural gas. Annual testing of the emergency shutdown system would be required and may include unsilenced blowdowns. As discussed in section 4.10.1.6, Transco would notify landowners in writing, and police, fire, and local officials would be notified by phone about 1 week prior to planned blowdown events. Silenced blowdown events for scheduled maintenance of the compressor station equipment occur more frequently, typically several times per year. Transco's blowdown silencers at Compressor Stations 200 and 206 would reduce the velocity of the exiting gas and muffle the resulting noise to 60 dBA at 300 feet. At Compressor Station 206, blowdowns would result in an estimated noise level of 45 dBA at the nearest point on the meditation trial planned by the NJBVMC, which is similar to the noise between a soft whisper and an urban residence (see table 4.10.2-1). Advanced notice could not be given in the event of an emergency blowdown; however emergency blowdowns would be rare.

We received comments regarding the impacts of low frequency noise on humans, birds, and wildlife. A commenter requested that we require Transco to update its analysis to include noise estimates at frequencies ranging from 1 to 32,000 Hz (very low to very high frequencies). Most avian species have the greatest hearing sensitivity between 1,000 and 4,000 Hz (Beason, 2004). Transco's noise analysis accounted for noise at frequencies ranging from 31.5 to 8,000 Hz, which covers avian sensitivity. Through the FERC's Landowner Helpline, we are aware that induced vibration, or a low frequency sound from pipelines, has occurred at a limited number of natural gas facilities in the over 300,000 miles of transmission pipeline in the United States. However, with hundreds of thousands of residents near natural gas pipelines we have observed no wide-scale evidence of low frequency noise from natural gas transmission pipelines inducing noise effects on local residences. We continue to address these issues through our landowner helpline as they arise. In our experience, high frequency noise and structural integrity is not a concern for compressor stations; however, should an issue arise FERC would address it on a case-by case basis. Our recommendation that Transco provide post-construction noise surveys would ensure that noise impacts on the surrounding area would comply with our regulations.

4.10.2.3 Conclusions

Onshore pipeline construction noise would be short-term and temporary, and HDD noise levels would be mitigated to comply with FERC requirements. Once construction is complete, noise levels would return to previous conditions. Operational noise levels from Compressor Stations 200 and 206 would comply with FERC noise requirements. Noise increases for each station are anticipated to be below 3 dBA at nearby NSAs, which is the threshold of perception for human hearing. Aside from the Morgan Shore HDD exit point, there are no NSAs within 1 mile of offshore construction activities. Based on the analysis presented in section 4.10.2; Transco's compliance with federal, state, and local noise regulations; Transco's proposed mitigation measures; and our recommendations, we conclude that operational noise resulting from the Project would not be significant.

4.11 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

CH_4, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. CH_4 has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. At atmospheric temperatures, CH_4 is buoyant and disperses rapidly in air. An unconfined mixture of CH_4 and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode.

We received general comments concerning whether the natural gas in the proposed pipeline loops would be odorized and what chemical odorant would be used. We also received comments expressing concern with natural gas odors in proximity to Compressor Station 206 during operation. To increase safety and make the CH_4 detectable, Transco would add a chemical odorant, mercaptan, which produces the familiar "natural gas smell." During planned natural gas blowdown events, the gas would be sent through a deodorizer to remove the mercaptan, prior to venting to the atmosphere. As discussed in section 4.10.1.6, Transco would notify landowners prior to planned blowdown events.

4.11.1 Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC 601. The DOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. PHMSA develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

The PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. DOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing, at a minimum, the federal standards. A state may also act as the DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions.

The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline.

DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. A Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) between DOT and FERC, dated January 15, 1993, provides guidance and policy regarding the agencies respective responsibilities to ensure safe and sound siting, design, construction, operations and maintenance. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

Transco has stated that the Project facilities would be designed, constructed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. We received comments concerning pipeline material specifications. DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion at 49 CFR 192.

The DOT also defines area classifications, based on population density near pipeline facilities, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

Class 1 – Location with 10 or fewer buildings intended for human occupancy.

Class 2 – Location with more than 10 but less than 46 buildings intended for human occupancy.

Class 3 – Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.

Class 4 – Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For example, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Class locations for the proposed pipelines have been determined based on the relationship of the pipeline centerline to other nearby structures and manmade features and are provided in table 4.11.1-1.

TABLE 4.11.1-1

Class Location Areas Crossed by the Northeast Supply Enhancement Project Pipeline Loops

Facility/County, State/Township	Milepost (Begin)	Milepost (End)	Class Location Designation	Pipeline Design (Class Location)
Quarryville Loop				
Lancaster County, PA				
Drumore	1681.0	1682.4	1	2
	1682.4	1682.8	2	2
	1682.8	1685.2	1	2
	1685.2	1685.3	2	2
	1685.3	1685.5	3	3
East Drumore	1685.5	1685.6	3	3
	1685.6	1686.0	1	2
	1686.0	1686.8	3	3
	1686.8	1688.6	1	2
	1688.6	1689.0	2	2
	1689.0	1689.2	1	2
	1689.2	1689.5	2	2
	1689.5	1690.0	1	2
Eden	1690.0	1691.2	1	2
Madison Loop				
Middlesex County, NJ				
Old Bridge	8.6	9.1	1	3
	9.1	9.2	3	3
	9.2	9.4	1	3
	9.4	10.2	3	3
	10.2	10.2	1	3
	10.2	10.4	3	3
Sayreville	10.4	12.0	3	3
Raritan Bay Loop (Onshore)				
Middlesex County, NJ				
Sayreville	12.0	12.2	3	3
Raritan Bay Loop (Offshore)				
Middlesex County, NJ				
Sayreville	12.2	12.7	1	1
Old Bridge	12.7	14.0	1	1
Not Applicable	14.0	18.1	1	1
Queens County, NY				
New York City	18.1	24.5	1	1
Richmond County, NY				
New York City	24.5	35.5	1	1

We received comments indicating that the State of New Jersey maintains more strict Class location standards for intrastate pipelines than the federal standards described above. The Class location for the proposed pipeline segments vary. In many cases Transco would design its pipelines to exceed the minimum federal safety design standards to provide equal or greater protection than is required. More specifically, 6.9 miles (68 percent) of the Quarryville Loop occurs in Class 1 areas, but Transco would design, construct, and operate the pipeline to Class 2 standards in these areas. For the Madison Loop, 0.8 mile (24 percent) of the pipeline occurs in Class 1 areas, but Transco would design, construct, and operate the pipeline to

Class 3 standards in these areas, resulting in the entire Madison Loop meeting Class 3 standards. Similar to Compressor Station 200, Transco would design Compressor Station 206 suction and discharge pipelines to meet Class 3 standards. If a subsequent increase in population density adjacent to the right-of-way results in a change in Class location for the pipeline, Transco would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required, to comply with DOT requirements for the new class location.

The DOT pipeline safety regulations require operators to develop and follow a written Integrity Management Program that contain all the elements described in 49 CFR 192.911 and address the risks on each transmission pipeline segment. The rule specifically requires operators to establish an Integrity Management Program to minimize the potential for an accident in all high-consequence areas (HCA), where an accident could do considerable harm to people and their property. This definition satisfies, in part, the Congressional mandate for DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[45] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle;[46] or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An "identified site" is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its Integrity Management Program to those sections of the pipeline within HCAs. DOT regulations specify the requirements for the Integrity Management Program in Subpart O of Part 192, Gas Transmission Pipeline Integrity Management.

Table 4.11.1-2 lists the HCAs for the NESE Project pipelines, which have been determined based on the relationship of the pipeline centerline to nearby structures and identified sites.

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[45] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in psig (gauge) multiplied by the square of the pipeline diameter in inches.

[46] The potential impact circle is a circle of radius equal to the potential impact radius.

TABLE 4.11.1-2

High Consequence Areas Crossed by the Northeast Supply Enhancement Project

Pipeline Segment	County/State	Begin Milepost	End Milepost	Length (miles)
Quarryville Loop	Lancaster, Pennsylvania	1685.9	1686.1	0.2
Madison Loop	Middlesex, New Jersey	9.4	12.0	2.6
Raritan Bay Loop (onshore) [a]	Middlesex, New Jersey	12.0	12.3 [a]	0.3

[a] The High Consequence Area for the onshore segment of the Raritan Bay Loop extends 660 feet beyond the shoreline into the water.

As discussed above, the pipeline and aboveground facilities would be designed, constructed, operated, and maintained in accordance with the DOT's Minimum Federal Safety Standards in 49 CFR 192. The general construction methods that Transco would implement, which would ensure the safety of the Project, are described in section 2.3, including welding, inspection, and integrity testing procedures. In addition, Transco states that it would exceed DOT standards by implementing the following measures:

- The pipe material would meet and generally exceed the American Petroleum Institute 5L pipe standards.
- Class 2 spacing would be used for new MLV assemblies in onshore Class 1 locations.
- Class 2 (0.6 design factor) pipe would be installed in all Class 1 (0.72 design factor) locations to increase the safety factor.
- Nondestructive inspection of 100 percent of welds would be conducted (49 CFR Part 192 requires testing of 10 percent of welds in Class 1 locations).
- Piping would be hydrostatically tested above the minimum federal requirements in 49 CFR Part 192, Subpart J. A minimum of Class 3 hydrostatic test requirements (1.5 times the MAOP test pressures) would be applied to all pipeline segments.
- Additional cover depth would be provided at certain onshore locations, including:
    - 36 inches of cover in non-rock areas (49 CFR 192.327 requires 30 inches in Class 1 areas and 36 inches for all other locations);
    - 36 inches of cover in active agricultural land (49 CFR 192.327 requires 30 inches in Class 1 areas and 36 inches for all other locations); and
    - 60 inches of cover under drainage ditches of public roads and railroad crossings (49 CFR 192.327 requires 36 inches).
- The Raritan Bay Loop would be installed with a minimum depth of cover of 4 feet over the pipeline in all non-anchorage areas, and with at least 7 feet of cover in designated anchorage areas.

Transco would meet or exceed PHMSA standards for MLV spacing and would install remotely operated valves at its new MLV sites. These sites would be monitored and controlled through Transco's Supervisory Control and Data Acquisition system, commonly referred to as SCADA. Transco Gas Control would monitor the pipeline system 24 hours per day, 7 days per week and, if an upset condition is detected, would remotely close the necessary valves to isolate the segment and stop gas flow.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;

- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;

- emergency system shutdown and safe restoration of service;

- making personnel, equipment, tools, and materials available at the scene of an emergency; and

- protecting people first and then property, and making them safe from actual or potential hazards.

We received general comments regarding Transco's emergency response procedures, and specific comments regarding the potential for a serious fire at Compressor Station 206 to spread to residential developments in the area, creating an incident that local fire departments may be unable to manage. Safety standards specified in Part 192 require that each operator establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. As required by the DOT, Transco would coordinate with local first responders, including the local fire department, to review the emergency response plan and provide mapping of the NESE Project facilities. Transco states it would work with local emergency officials to determine response procedures for remote residential areas with limited entry and exit routes. Transco would also conduct site-specific training and operator-simulated emergency exercises for local first responders. Finally, Transco would use all available and relevant means to support local emergency personnel in the event of an incident involving any of the Project facilities.

The DOT also requires pipeline operators to place pipeline markers at frequent intervals along the pipeline rights-of-way, such as where a pipeline intersects a street, highway, railway, or waterway, and at other prominent points along the route. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Pipeline markers identifying the owner of the pipe and a 24-hour telephone number would be placed for "line of sight" visibility along the entire pipeline length, except in active agricultural crop locations and in waterbodies in accordance with DOT requirements. Because the pipeline right-of-way is much wider than the pipeline itself, and a pipeline can be located anywhere within the right-of-way, state laws require excavators to call their state One Call center well in advance of digging to locate underground utilities and ensure it is safe for the contractor to dig in that location.

We received comments expressing concern with pipeline leaks. In accordance with DOT regulations, the proposed facilities would be regularly inspected for leakage as part of scheduled operations and maintenance, including:

- physically walking and inspecting the pipeline corridor periodically;
- conducting fly-over inspections of the right-of-way as required;

- inspecting valves and maintaining compressor engines; and
- conducting leak surveys at least once every calendar year or as required by regulations.

During inspections, employees would look for signs of unusual activity on the right-of-way and would immediately respond to assess the nature of the activity and remedy with prescribed corrective action. In addition to the DOT-required surveys described above, Transco would monitor its pipeline system from the Transco Gas Control center. This control center monitors the pipeline system with sophisticated computer and telecommunications equipment that can detect pressure drops along the pipelines and stop the flow of gas to the problem area by isolating sections along the pipe. Transco's Gas Control Center operates 24 hours a day, 7 days a week.

4.11.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to the PHMSA. Incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization;
- involve property damage, including cost of gas lost, of more than $50,000, in 1984 dollars;[47]
- release 5 barrels or more of a highly volatile liquid or 50 barrels or more of other liquid; or
- results in an unintended fire or explosion.

Incidents may also include events that are significant in the judgment of the operator, even though they did not meet the criteria above. During the 20-year period from 1998 through 2017, a total of 1,365 significant incidents were reported on the more than 300,000 miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.11.2-1 provides a distribution of the causal factors as well as the number of each incident by cause from 1998 to 2017.

The dominant causes of pipeline incidents from 1998 to 2017 were corrosion and pipeline material, weld, or equipment failure, constituting 49.6 percent of all significant incidents. The pipelines included in the data set in table 4.11.2-1 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

[47] $50,000 in 1984 dollars is approximately $118,107 in 2017 (Bureau of Labor Statistics, 2017).

TABLE 4.11.2-1

Natural Gas Transmission Pipeline Significant Incidents by Cause (1998-2017) [a]

Cause	Number of Incidents	Percentage
Pipeline material, weld, or equipment failure	403	27.0
Corrosion	324	23.7
Excavation	198	16.0
All other causes [b]	149	12.6
Natural force damage	148	11.1
Outside Force [c]	90	6.4
Incorrect operation	53	3.1
TOTAL	1,365	100

[a] All data gathered from PHMSA Significant Incident files.
[b] Miscellaneous causes or other unknown causes.
[c] Fire, explosion, vehicle damage, previous damage, intentional damage.
Source: PHMSA, 2018.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. Jones et al. (1986) compared reported incidents with the presence or absence of CP and protective coatings. The results of that study, summarized in table 4.11.2-2, indicated that corrosion control was effective in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a CP system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe. The data also indicate that cathodically protected pipe without a protective coating has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of CP to actively corroding spots on pipes.

TABLE 4.11.2-2

Incidents Caused by External Corrosion and Level of Protection (1970 through June 1984)

Corrosion Control	Incidents per 1,000 Miles per Year
None – bare pipe	0.4
Cathodic protection only	1.0
Coated only	0.4
Coated and cathodic protection	0.1

Source: Jones et al., 1986

We received comments regarding the potential effects of corrosion on Transco's existing and proposed pipelines, particularly for the Raritan Bay Loop which would be installed beneath the seafloor in a saltwater environment. We received comments expressing concern that operation of Compressor Station 206 would increase the velocity and pressure of the gas flowing through the existing pipelines (discharge pipelines). Commenters believes that this would result in increased pipeline corrosion and request that the existing pipeline be assessed to ensure the pipeline's integrity. Transco's pipeline facilities meet DOT's regulations at 49 CFR Part 192.475-77, which address pipeline corrosion, in addition to implementing its pipeline integrity management program to reduce the potential of corrosion. In its October 5, 2018 filing (Accession No. 20181005-5181), Transco states that it evaluates designs to minimize "dead legs", which are stagnant areas where lack of gas flow could allow entrained moisture to precipitate from the gas stream and collect as a liquid, resulting in a potentially corrosive environment. Transco also employs technology to address and mitigate the risk of corrosion, including moisture monitoring equipment, corrosion inhibiting chemical injection systems, dehydration systems, corrosion monitoring coupons, and liquid management systems, where necessary. During operations, Transco verifies the receipt of dry, tariff quality gas through quality control measures to ensure that moisture and oxygen are not inadvertently introduced into the system. Moisture content is monitored where the potential for water to be introduced has been identified. If moisture content exceeds 7 pounds per million standard cubic feet, Transco locates and stops the source of the moisture to minimize the potential for corrosive conditions. In addition, internal coatings used for flow assurance purposes also provide an additional layer of internal corrosion protection, functioning to isolate the metal from potential contact with water and oxygen.

As described in sections 2.1 and 2.3, the NESE Project pipeline loops would be coated internally and externally to inhibit corrosion, and the Raritan Bay Loop would also be externally coated with concrete for buoyancy control. The pipeline facilities would be further protected from corrosion by the CP systems[48] described in section 2.1.1.1. Transco personnel would check the voltage and amperage of the CP systems at regular intervals as well as the pipe-to-soil potentials and rectifiers. In addition, annual surveys would be completed, as described above. Internal corrosion within the offshore pipeline would not occur at a different rate than that of onshore pipelines, assuming standard operation, as pipelines are closed systems and would not be exposed to ocean water. In addition, within 10 years of placing the pipeline into service and every 7 years thereafter, Transco would use an inline inspection tool (smart pig) to inspect the onshore and offshore pipelines for anomalies, such as pipe wall metal loss caused by corrosion. When anomalies are identified, Transco takes corrective action.

Older pipelines also have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipeline systems contain a disproportionate number of smaller diameter pipelines, which are more easily crushed or broken by mechanical equipment or earth movements.

Outside force, excavation, and natural forces were the cause in 31.3 percent of significant pipeline incidents from 1998 to 2017. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geological hazards; and weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.11.2-3 provides a breakdown of outside force incidents by cause.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities near pipelines. The One Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

We received comments asserting that Transco has a poor safety record, thereby increasing the public safety risk of the NESE Project. As discussed above in section 4.11.1, our regulations require applicants to certify that projects under our jurisdiction would be designed, constructed, and operated in accordance with DOT specifications, which are specifically designed to protect pipeline operators and the public. The FERC accepts this certification and does not impose additional safety standards. The Commission reviews each project on its own merits and has siting authority for interstate natural gas infrastructure. PHMSA would be notified of and investigate all pipeline incidents and take any necessary action. Although this information is not relevant to the Commission's review of the NESE Project, pipeline operator compliance and incident history is publicly available on the PHMSA website at www.phmsa.dot.gov/pipeline.

[48] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

TABLE 4.11.2-3

Outside Forces Incidents by Cause [a] (1998-2017)

Cause	Number of Incidents	Percent of All Incidents
Third party excavation damage	160	11.7
Heavy Rain/Floods	78	5.7
Vehicle (not engaged with excavation)	52	3.8
Earth Movement	29	2.1
Lightning/Temperature/High Winds	30	2.2
Operator/Contractor excavation damage	26	1.9
Unspecified excavation damage/Previous damage	12	0.9
Unspecified Natural force	4	0.3
Fire/Explosion	10	0.7
Fishing or maritime activity	7	0.5
Unspecified/Other outside force	11	0.8
Previous mechanical damage	6	0.4
Electrical arcing from other equipment/facility	1	0.1
Intentional damage	1	0.1
TOTAL	**427**	31.3

[a] Excavation, Outside Force, and Natural Force from table 4.11.2-1.
Source: PHMSA, 2018.

We also received comments concerning the potential for the underground pipelines to be impacted by forces of nature, including flooding and earthquakes. As noted previously, the new pipelines would be constructed to meet the safety standards established by PHMSA in 49 CFR 192, which includes measures to protect pipelines from flooding events (e.g., anchoring in wetlands, deeper burial across waterbodies). Specifically, 49 CFR 192.317 requires that pipeline operators take all practicable steps to protect the pipeline from hazards (e.g., flooding, landslides, ship anchors, and hurricanes). In addition, as discussed in section 2.6.1, Transco would monitor the onshore pipeline facilities during operation in accordance with DOT requirements, including periodic ground inspections that would identify soil/sediment erosion that may expose the pipe. As further discussed in section 2.6.1, Transco has designed the Raritan Bay Loop and ancillary offshore facilities to operate in the saltwater environment of Raritan Bay and Lower New York Bay, and to accommodate potential stresses associated with tropical storm events. Transco would utilize the results of its sediment transport model in combination with post-construction survey to verify that adequate burial depth is maintained over the subsea facilities, and would use the results of year-over-year post-construction surveys to develop an offshore pipeline inspection schedule for the operating life of the Project. Section 4.1.4.1 describes seismicity in the Project area and concludes that the potential for a damaging earthquake in the area is low.

We received numerous comments on the age of Transco's existing pipelines in the immediate Compressor Station 206 area. Specifically, commenters were concerned that an increase in the MAOP along the existing system could result in an incident due to the pipelines' age. Transco's states that its existing Mainline A and Mainline C pipelines upstream and downstream from Compressor Station 206 were constructed in 1950 and 1969, respectively, and were relocated and replaced in 1987 to accommodate an expansion of the Trap Rock quarry. Although within Class 1 and 2 areas, Transco designed the existing pipelines to meet Class 3 standards as an increased safety precaution. The MAOP for Mainlines A and C is currently 800 pounds per square inch and would remain so after construction of the NESE Project. In addition, Transco hydrostatically tests its pipelines at 1.5 times the MAOP to ensure safety. Finally, based on the MAOP of the suction and discharge pipelines at the station, the potential impact radius at Compressor Station 206 would be 820 feet.

4.11.3 Impact on Public Safety

The service incident data summarized in table 4.11.2-1 include pipeline failures of all magnitudes with widely varying consequences. Table 4.11.3-1 presents the average annual fatalities that occurred on natural gas transmission lines between 2013 and 2017. The data have been separated into employees and nonemployees to better identify a fatality rate experienced by the public.

TABLE 4.11.3-1

Injuries and Fatalities – Natural Gas Transmission Pipelines

	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2013	0	2	0	0
2014	1	0	1	0
2015	1	15	4	2
2016	2	1	2	1
2017	1	2	1	2

Source: PHMSA, 2018.

Most fatalities from natural gas pipelines are associated with local distribution pipelines. These pipelines are not regulated by FERC; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes and/or plastic pipes that are more susceptible to damage. In addition, local distribution systems do not have large rights-of-way and pipeline markers common to FERC-regulated interstate natural gas transmission pipelines.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 4.11.3-2 to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. As indicated in table 4.11.3-2, the number of fatalities associated with natural gas facilities is much lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1996 to 2015, there were an average of 65 significant incidents, 9 injuries, and 2 fatalities per year. The number of significant incidents distributed over the more than 303,000 miles of natural gas transmission pipelines indicates the risk is low for an incident at any given location.

We received several comments concerning the safety and maintenance of the Raritan Bay Loop during operation. As previously indicated, all Project facilities, including the Raritan Bay Loop, would be designed, constructed, and operated in accordance with DOT standards at 49 CFR 192. The Raritan Bay Loop would also operate in a Class 3 location, which indicates a lower risk to the public. Several commenters questioned whether public safety could be improved by reducing the operating pressure of the Raritan Bay Loop through installing a larger diameter pipeline. As described in section 1.1, the Project was designed to efficiently meet the volume and delivery specifications of National Grid, which would further deliver the NESE Project capacity to its downstream customers in the New York City area. Reducing the operating pressure of the Raritan Bay Loop by increasing the pipeline diameter, therefore, may not meet the purpose of the Project; would result in increased environmental impacts due to increased excavation and construction time; and may represent overbuilding, which is not permitted by our regulations.

We received numerous comments expressing concern that the municipal water system would be unable to provide adequate water supply in the event of a fire at Compressor Station 206. As indicated in table 1.4-1, Franklin Township is planning to upgrade the municipal water service near Compressor Station 206, which Transco states would provide adequate water supply for operation of the station. Transco has stated that it would install a potable water tank(s) for temporary operational water use if the municipal repairs are not completed before Compressor Station 206 goes into service. In addition, DOT requires in 49 CFR Part 192.167 that each compressor station (except for unattended field compressor stations of 1,000 horsepower or less) have an emergency shutdown system that must meet several specifications in the event of an emergency or fire at the compressor station. The emergency shutdown system would be automated to quickly isolate gas piping, stop equipment, and safely vent station gas. Transco has stated that its automated emergency shutdown system would provide the most effective way to begin to address an emergency and that no fire hydrant would be necessary to address a fire at the site.

TABLE 4.11.3-2

Nationwide Accidental Deaths [a]

Type of Accident	Annual No. of Deaths
All accidents	146,571
Motor vehicle	35,369
Poisoning	38,851
Falls	30,208
Drowning	3,391
Fire, smoke inhalation, burns	2,760
Floods [b]	85
Tornado [b]	69
Lightning [b]	44
Hurricane [b]	47
Natural gas distribution lines [c]	4
Natural gas transmission pipelines [c]	1

[a] All data, unless otherwise noted, reflects 2014 statistics from: Kochanek et al., 2016.
[b] Represents the 30-year average of accidental deaths between 1988 and 2017: National Weather Service, 2018.
[c] 20-year average (public and employee), 1998-2017. PHMSA, 2018.

4.11.4 Compressor Station Incidents

We received numerous comments expressing concern about serious safety incidents at Compressor Station 206 and referencing previous incidents at other compressor stations, natural gas pipeline facilities, and pipelines that transport other hazardous products. In 2010, PHMSA began identifying compressor station incidents as a sub-category within its “Material/Weld/Equipment Failure” category of pipeline incidents. There were 19 compressor station incidents reported throughout the United States between 2010 and 2016, resulting in 1 injury and no fatalities (PHMSA, 2017).

Consistent with the data presented in section 4.11.3, based on the the extensive pipeline infrastructure in the United States (including compressor stations), the likelihood of a significant incident at a given compressor station is low and, previous noted, Compressor Station 206 would be designed, constructed, operated, and maintained in accordance with modern engineering practices and DOT Minimum Federal Safety Standards in 49 CFR 192.

We received numerous comments from landowners regarding the potential for blasting at the Trap Rock quarry to damage Compressor Station 206, resulting in a serious public safety incident. Some commenters contend that the compressor station would be constructed at or next to the quarry, and are concerned about direct damage from blasting. However, the compressor building would be about 0.4 mile from the nearest face of the quarry and, based on zoning, the quarry is not expected to expand toward the compressor station site. Other commenters are concerned about the potential for blasting-induced ground vibrations to damage the compressor station over time, and they attribute cracked foundations in some area homes to blasting at the quarry. Transco conducted vibration monitoring, vibration analysis, geotechnical investigation, and foundation design at the compressor station site.[49] The vibration monitoring included collecting data at three locations during two scheduled blasting events at the quarry; the frequency of blasting at the quarry varies, but averages three to four times per month. The monitoring locations included the proposed compressor building; a location approximately midway between the compressor building and the nearest face of the quarry; and a location between the quarry and the location where the compressor building inlet and outlet pipelines would connect to the Mainline. The vibration monitoring sensors measured the peak particle velocity (PPV), sound pressure, and dominant frequency from each blasting event. The geotechnical study included the placement of 11 standard penetration test soil borings in and around the compressor station layout and soil sample collection for laboratory analysis of geotechnical properties. Trap Rock is required to conduct blasting in accordance with NJAC 12:190-7:26, which limits the PPV caused by blasting and requires that precautions be taken to avoid damage to nearby structures. As part of its complaince program, Trap Rock monitors blasting-related vibrations at five locations around the quarry, and provided approximately 85 PPV measurements recorded during other blasting events. The maximum PPV recorded by either Transco or Trap Rock was used to evaluate blasting-induced vibrations (displacements) on foundations and equipment at the compressor station. Other inputs included geotechnical soils data, geologic and hydrogeologic information, and the weight of various equipment and recommended foundations. Based on this analysis, the peak blast-induced displacement of the various equipment and foundations at the facility ranged from 0.006 to 0.019 millimeter, and the maximum displacement of the compressors was determined to be 0.007 millimeter, which converts to 0.28 mil peak to peak.[50] We reviewed the blast vibration analysis and find it acceptable for the purpose of our review.

The compressor units would operate on bearings that are designed to meet vibration requirements. Each compressor unit would include 16 vibration monitors, and vibrations of 3.2 to 4.0 mils peak to peak would initiate an automatic shut down of the unit. Commenters were concerned that blasting intensity could increase in the future or that blasting-related vibrations could have a cumulative effect on the compressor station. As noted, the unit shut down level of vibration is more than an order of magnitude greater than the peak blast-induced displacement determined using the maximum PPV from Transco and Trap Rock. Transco has also committed to incorporate safety factors in the final foundation designs of the facility to prevent displacement if future blast intensity increases. Transco concludes that the normal vibration associated with operation of the compressor station, coupled with the periodic displacements from blasting, would not exceed the vibration limits on the unit bearings or cause long-term maintenance issues. We note that the vibration monitoring system would initiate a shut-down of the compressor unit if vibrations were detected in excess of unit bearing limits, regardless of the source or cumulative effect of vibrations. In addition, based on the MAOP of the inlet and outlet piping, proposed Compressor Station 206 would not be located within an HCA. Based on the above discussion, we conclude that Compressor Station 206 would be adequately protected from blasting activities at the Trap Rock quarry; however, to verify that the design accounts for potential increases in future blast intensity, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, stamped and sealed by the professional engineer-of-record in New Jersey, the final foundation designs that**

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49 The Geotechnical and Vibration Analysis Report for Compressor Station 206 can be found at Accession No. 20170601-5277.

50 A mil equals 1/1000 of an inch, and peak to peak refers to the distance between the highest and lowest points that a vibrating surface moves. For reference, 0.28 mil is about 0.1 times the thickness of common 20-pound office paper.

incorporate safety factors to prevent displacement if future blast intensity increases at the Trap Rock Quarry.

Commenters also expressed concern that blasting at the Trap Rock quarry could damage Transco's existing Mainline pipelines in the area. Mining has occurred at the quarry since the mid-1850s and, as noted in section 4.11.2, Transco's Mainline A and C were originally installed in 1950 and 1969, respectively, but were rerouted in 1987 to accommodate expansion of the quarry. Thus, the pipelines are 30 years old and are about 0.4 mile from the nearest quarry face at their closest approach. Transco states that their pipelines are constructed with an allowable PPV of 4 inches per second, whereas NJAC 12:190-7:26 limits the PPV caused by blasting to 2 inches per second to avoid damage at nearby structures. In addition, the pipelines are located in Class 1 and Class 2 areas near the quarry, but are designed and operated in accordance with Class 3 standards for added safety. Lastly, Transco stated that there have been no operational issues on their system attributable to the Trap Rock quarry, and none of the commenters identified any recent or historic pipeline safety incidents in the area of the quarry. Based on the above discussion, we conclude that blasting at the Trap Rock quarry does not pose a safety concern to Transco's Mainline system.

New York City, which is assisting us in preparing this EIS, expressed concern regarding Transco's ability to deliver the contracted NESE Project natural gas volumes to National Grid in the event that Compressor Station 206 were to shut down for any reason, including due to excess vibration. In the event of an emergency resulting in loss of power, the emergency generator onsite would provide temporary power to Compressor Station 206. Transco states that the NESE Project would increase system reliability by diversifying transportation pathways used to supply natural gas to New York City. Should an incident require a complete shutdown, Compressor Station 206 would likely be fully or partially bypassed and natural gas volumes would flow through the station without being compressed, or would not flow through the station at all by using isolation valves to safely reroute the natural gas away from an emergency. In this instance, natural gas volumes would be provided to National Grid and Transco's other affected customers by other means, likely other routes along the pipeline system, pending Compressor Station 206 returning to full service.

We received comments expressing concern on procedures at compressor station sites during a power outage at Compressor Station 206. Transco would install an emergency generator at Compressor Stations 200 and 206. In the event of an electrical outage, the generators would provide the necessary power to the stations.

4.11.5 Terrorism and Security Issues

Safety and security concerns have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities. The Office of Homeland Security is tasked with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the United States. Among its responsibilities, the Department of Homeland Security oversees the Homeland Infrastructure Threat and Risk Analysis Center, which analyzes and implements the National Critical Infrastructure Prioritization Program that identifies and lists Tier 1 and Tier 2 assets. The Tier 1 and Tier 2 lists are key components of infrastructure protection programs and are used to prioritize infrastructure protection, response, and recovery activities.

The Commission, like other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the Commission has taken measures to limit the distribution of information to the public regarding facility design to minimize the risk of sabotage. Facility design and location information has been removed from the FERC's website to ensure that sensitive information filed as Critical Energy Infrastructure Information is not readily available to the public (Docket No. RM06-23-000, issued October 30, 2007 and effective as of December 14, 2007).

The likelihood of future acts of terrorism or sabotage occurring at the NESE Project facilities, or at any of the myriad natural gas pipeline or energy facilities throughout the United States, is unpredictable given the disparate motives and abilities of terrorist groups. Further, the Commission, in cooperation with other federal agencies, industry trade groups, and interstate natural gas companies, is working to improve pipeline security practices, strengthen communications within the industry, and extend public outreach in an ongoing effort to secure pipeline infrastructure.

In accordance with the DOT surveillance requirements, Transco would incorporate air and ground inspection of its proposed facilities into its inspection and maintenance program. Security measures at Compressor Stations 200 and 206 would include secure fencing, onsite personnel during business hours, and 24-hour per day remote monitoring from Transco's Gas Control facility. To further enhance security at Compressor Station 206, security measures would include video cameras, intrusion alarms, and coded keyed access.

Despite the ongoing potential for terrorist acts along any of the nation's natural gas infrastructure, the continuing need for the construction of these facilities is not eliminated. Given the continued need for natural gas conveyance and the unpredictable nature of terrorist attacks, the efforts of the Commission, the DOT, and the Office of Homeland Security to continually improve pipeline safety would minimize the risk of terrorist sabotage of the NESE pipeline facilities to the maximum extent practical, while still meeting the nation's natural gas needs. Moreover, the unpredictable possibility of such acts does not support a finding that this particular Project should not be constructed.

4.12 CUMULATIVE IMPACTS

In accordance with NEPA, we considered the cumulative impacts of the NESE Project and other actions in the area. Cumulative impacts represent the incremental effects of a proposed action when added to other past, present, or reasonably foreseeable future actions. Although the individual impact of each separate activity may be minor, the additive, or synergistic, effects of multiple activities could be significant. Consistent with CEQ guidelines, we have aggregated past actions that helped shape the environment into what it is today into our discussion of the affected environment in section 4.0. Therefore, present and reasonably foreseeable future actions are discussed in this section. To avoid unnecessary discussions of insignificant actions and impacts, the cumulative impacts analysis for this Project was conducted using the following guidelines:

- Another action must impact the same resource as the Project for there to be a cumulative impact. For the most part, this is possible when other projects are within the same general location as the Project (i.e., within a defined geographic scope). The effects of more distant projects generally are not assessed because their impacts would typically diminish with distance and, thus, would not significantly contribute to impacts in the Project area. Certain exceptions may be made where a resource is regionally or nationally rare or unique and where concern for a cumulative impact is substantial.

- A cumulative effect can exist only for the same duration as the Project effect; once the Project effect ceases, there is no longer a cumulative effect associated with the Project. As discussed in the preceding environmental analysis, most Project impacts are temporary or short term. Notable exceptions are forest clearing and operational air emissions, which may be long term or permanent.

Our cumulative impacts analysis takes a hard look at the potential impacts of other actions as described in relevant guidance. NEPA requires reasonable forecasting, but an agency is not required to engage in speculative analysis or to do the impractical, if not enough information is available to permit meaningful consideration. We were able to obtain detailed impact data from NEPA or similar documents prepared for some of the actions we identified in our cumulative impacts analysis. For other actions with sufficient publicly available information, we estimated potential cumulative impacts where we determined it was reasonable to do so by approximating project boundaries based on project descriptions, maps, and aerial photography, and desktop-based GIS data (e.g., land cover, wetlands and waterbodies). Much of the publicly available information identified only the parcels on which development would occur, but did not include details about how each site would be developed (i.e., which portions of a parcel would be affected and which portions would remain unchanged). In those cases, we assumed the entire parcel would be developed. For other projects lacking sufficient publicly available information to allow for reasonable quantification of impact, the impact can only be described qualitatively.

4.12.1 Geographic Scope and Temporal Extent for Cumulative Impacts

The geographic scope of cumulative effects (also referred to as the cumulative impact area) is based on the geographic extent of expected Project impacts, which varies depending on the resource being discussed. As previously stated, certain exceptions may be made where a resource is regionally or nationally rare or unique and where concern for a cumulative impact is substantial. Table 4.12.1-1 identifies resource-specific geographic scope. More detail about each resource's geographic scope is included in the various resource discussions in section 4.12.3.

The temporal extent of cumulative effects is based on the expected duration of Project impacts, which also varies depending on the resource being discussed. As previously stated, a cumulative effect can exist only for the same duration as the Project effect; once a Project effect no longer exists, it no longer contributes to or has a cumulative effect. Table 4.12.1-1 identifies resource-specific temporal extent of potential cumulative impacts. More detail is provided by resource in section 4.12.3. As discussed in section 4.0, four impact durations are defined for the NESE Project:

- temporary – impacts generally occur during construction with the resource returning to preconstruction condition almost immediately afterword or within a few months;
- short term – impacts could continue for up to 3 years following construction;
- long term – impacts would be expected continue for 3 or more years following construction, but the resource would eventually recover to pre-construction conditions; and
- permanent – impacts continue over the operating life of the project and the resource does not return to pre-construction condition.

4.12.1.1 Present and Reasonably Foreseeable Future Actions

We identified seven types of present and reasonably foreseeable actions that could cause a cumulative impact when considered with the Project. These are:

- non-jurisdictional facilities associated with the Project, such as water and electric power supply required for compressor stations;
- energy projects, such as construction of electric generation plants, pipelines, or powerlines;

- transportation projects, such as highway construction and bridge restoration;
- residential projects, such as constructing apartment buildings and developing single-family home subdivisions;
- commercial and industrial projects, such as retail development and manufacturing facility construction;
- beach and shoreline management projects, such as replenishing beach sand, reinforcing shoreline groins, removing abandoned structures, and constructing floodwalls; and
- dredging projects, such as periodic excavation of shipping channels that become filled with sediment over time.

TABLE 4.12.1-1

Resource-specific Geographic Scope and Temporal Extent for Cumulative Impacts

Resource	Geographic Scope	Temporal Extent [a]
GEOLOGY		
Onshore and Offshore	NESE Project workspace	Temporary, except permanent where bedrock or paleontological resource are affected
SOILS		
Onshore	NESE Project workspace	Temporary, except permanent where aboveground facilities are installed
Offshore	Marine sediments discussed in Surface Waters, Fish, and Aquatic Resources	Marine sediments discussed in Surface Waters, Fish, and Aquatic Resources
GROUNDWATER		
Onshore	Aquifers within the HUC-12 sub-watersheds crossed by the NESE Project	Temporary
Offshore	Not applicable (no potable aquifers in the offshore environment)	Not applicable
SURFACE WATERS, FISH, AND AQUATIC RESOURCES		
Onshore	Waterbodies crossed by and downstream of the NESE Project that are within the HUC-12 sub-watersheds crossed by the NESE Project	Temporary to short-term
Offshore	Area encompassing 1,250 feet beyond the 0.12-inch (0.3 cm) sedimentation contour for the Raritan Bay Loop for turbidity and sedimentation impacts; 2.9 miles from construction for underwater noise impacts	Temporary to short-term
WETLANDS		
Onshore	Wetlands within the HUC-12 sub-watersheds crossed by the NESE Project	Temporary to permanent depending on wetland type and whether the wetland occurs within the construction or operational footprint of the NESE Project
Offshore	Not applicable	Not applicable
VEGETATION AND WILDLIFE		
Onshore	Vegetation communities within the HUC-12 sub-watersheds crossed by the NESE Project	Temporary to permanent depending on vegetation type and whether the vegetation community occurs within the construction or operational footprint of the NESE Project
Offshore	Marine wildlife discussed in Surface Waters, Fish, and Aquatic Resources	Marine wildlife discussed in Surface Waters, Fish, and Aquatic Resources
SPECIAL STATUS SPECIES		
Onshore	Vegetation communities within the HUC-12 sub-watersheds crossed by the NESE Project	Temporary to permanent depending on vegetation type
Offshore	Area encompassing 1,250 feet beyond the 0.12-inch (0.3 cm) sedimentation contour for the Raritan Bay Loop	Temporary to short-term

TABLE 4.12.1-1 (cont'd)		
Resource-specific Geographic Scope and Temporal Extent for Cumulative Impacts		
Resource	Geographic Scope	Temporal Extent [a]
LAND USE, RECREATION, AND VISUAL RESOURCES		
Onshore	Land cover within the HUC-12 sub-watersheds crossed by the NESE Project; recreation within 0.25 mile of the NESE Project; common viewpoints from which NESE Project impacts would be visible	Temporary to permanent depending on land cover
Offshore	The area within 0.5 mile of the proposed NESE Project; common viewpoints from which NESE Project impacts would be visible	Temporary
SOCIOECONOMICS		
Onshore	Counties crossed by the NESE Project	Temporary to permanent depending on construction or operational activity
Offshore	New York and New Jersey state waters and shorelines within Raritan and Lower New York Bay	Temporary
CULTURAL RESOURCES		
Onshore and Offshore	Not applicable (no eligible or potentially eligible cultural resources would be affected by the NESE Project)	Not applicable
AIR QUALITY		
Onshore Construction	Concurrently constructed projects within 0.25-mile of the NESE Project	Temporary
Onshore Operation	50-kilometer radius around Compressor Station 206	Permanent
Offshore Construction	Within 0.25-mile of the NESE Project	Temporary
Offshore Operation	Not applicable	Not applicable
NOISE		
Onshore Construction	Concurrently constructed projects within 0.25 mile of the NESE Project and 0.5 mile of HDD entry and exit points	Temporary
Onshore Operation	Within 1.0 mile of Compressor Stations 200 and 206	Permanent
Offshore Construction	Within 0.25 mile of the NESE Project and 0.5 mile of HDD entry and exit points	Temporary
Offshore Operation	Not applicable	Not applicable

[a] Temporary impacts extend from the start of Project construction to a few months after construction is completed.
Short term impacts extend up to 3 years after construction.
Long term impacts extend more than 3 years after construction but the resource recovers to pre-construction condition.
Permanent impacts extend continue throughout the operating life of the Project and the affected resource does not return to pre-construction condition.

HUC = hydrologic unit code

Table 4.12.1-2 summarizes other actions that are being constructed or are planned near the Project. These actions were identified by a review of publicly available information; consultation with federal, state, and local planning agencies; and information provided by Transco. These actions have the potential for cumulative impacts on the environment because of their location and timing relative to the proposed Project. For a conservative approach, we generally assumed that other actions with unknown schedules would be constructed at the same time as the NESE Project. An overview of the seven types of actions that could result in cumulative impacts is provided below. Table 4.12.1-3 provides details regarding each action, and the actions are depicted on figure 4.12.1-1 (sheets 1 through 5).

TABLE 4.12.1-2

Summary of Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts

Resource	Action Identification
GEOLOGY	
Onshore	NJ-1, EN-1, EN-3, RS-9, RS-10
Offshore	Not applicable
SOILS	
Onshore	NJ-1, EN-1, EN-3, RS-9, RS-10
Offshore	EN-6, CD-1
GROUNDWATER	
Onshore	NJ-1, EN-1, EN-3, EN-4, EN-5, EN-6, TR-1, TR-2, TR-3, TR-4, TR-8, RS-1, RS-2, RS-3, RS-4, RS-5, RS-6, RS-7, RS-9, RS-10, RS-11, RS-12, CI-1, CI-2, CI-3, CI-4, CI-5, CI-6, CI-7, CD-1
Offshore	Not applicable
SURFACE WATERS, FISH, AND AQUATIC RESOURCES	
Onshore	EN-1, EN-3, EN-4, EN-6, TR-1, TR-2, TR-4, RS-4, RS-6, RS-7, RS-10, RS-11, RS-12, CI-3, CI-4, CI-6, CD-1
Offshore	EN-6, CD-1
WETLANDS	
Onshore	EN-1, EN-3, EN-5, TR-4, RS-4, RS-6, RS-9, RS-10, RS-11, RS-12, CI-3, CI-4, CI-6
Offshore	Not applicable
VEGETATION AND WILDLIFE	
Onshore	NJ-1, EN-1, EN-3, EN-4, EN-5, TR-2, TR-3, TR-4, RS-11, RS-5, RS-12, RS-3, RS-9, RS-4, RS-6, RS-1, RS-2, RS-7, RS-10, CI-7, CI-5, CI-4, CI-2, CI-6, CI-1, CI-3
Offshore	EN-6, CD-1
SPECIAL STATUS SPECIES	
Onshore	NJ-1, EN-1, EN-3, EN-4, EN-5, TR-2, TR-3, TR-4, RS-1, RS-2, RS-3, RS-4, RS-5, RS-6, RS-7, RS-9, RS-10, RS-11, RS-12, CI-1, CI-2, CI-3, CI-4, CI-5, CI-6, CI-7
Offshore	EN-6, CD-1
LAND USE, RECREATION, AND VISUAL RESOURCES	
Onshore	NJ-1, EN-1, EN-3, EN-4, EN-5, EN-6, TR-1, TR-2, TR-3, TR-4, TR-8, RS-1, RS-2, RS-3, RS-4, RS-5, RS-6, RS-7, RS-9, RS-10, RS-11, RS-12, CI-1, CI-2, CI-3, CI-4, CI-5, CI-6, CI-7, CD-1
Offshore	EN-6, CD-1
SOCIOECONOMICS	
Onshore	NJ-1, EN-1, EN-2, EN-3, EN-4, EN-5, EN-6, TR-1, TR-2, TR-3, TR-4, TR-5, TR-6, TR-7, TR-8, RS-1, RS-2, RS-3, RS-4, RS-5, RS-6, RS-7, RS-8, RS-9, RS-10, RS-11, RS-12, CI-1, CI-2, CI-3, CI-4, CI-5, CI-6, CI-7, CI-8, CI-9, CI-10, CI-11, CI-12, CD-1
Offshore	EN-6, BR-1, BR-2, BR-3, CD-1, CD-2, CD-3, CD-4, CD-5
CULTURAL RESOURCES	
Onshore	Not applicable
Offshore	Not applicable
AIR QUALITY	
Onshore	Construction: NJ-1, RS-1, RS-9, RS-10, CI-2, CD-1 Operation: EN-7
Offshore	EN-6, CD-1
NOISE	
Onshore	Construction: NJ-1, RS-1, RS-9, RS-10, CI-2 Operation: EN-3, RS-1, RS-2, CI-2, CI-3
Offshore	EN-6, CD-1

TABLE 4.12.1-3

Present and Future Actions within the Cumulative Geographic Scope and Temporal Extent

ID	Type/Action Name	Description	General Location	Location Relative to the NESE Project	Timing [a]	Estimated Scale
NON-JURISDICTIONAL FACILITIES						
NJ-1	Power Supply to Compressor Station 200	PECO Energy Company would provide new electrical service to Compressor Station 200. The new service would involve modifying existing electric transmission infrastructure within a right-of-way between the compressor station and an existing substation about 0.9 mile away. Modification to existing infrastructure may include replacement or addition of poles within the existing corridor.	Chester County, PA	At and adjacent to CS 200	2018	11 acres
ENERGY PROJECTS						
EN-1	Atlantic Sunrise Pipeline Project (CP15-138)	The Atlantic Sunrise Pipeline Project is a natural gas transmission project under construction by the Williams Pipe Line Company that would provide 1.7 million Dth/d of capacity to Mid-Atlantic and Southeast markets. The project includes 199.4 miles of greenfield, looping, and replacement pipeline; two new compressor stations in PA; modifications to three existing compressor stations in PA and MD; new meter and regulating stations in PA; and appurtenant facilities.	PA, MD, VA, NC, SC	Intersects the Quarryville Loop at about MP 1683.2	Placed in-service October 2018, restoration underway	Includes River Road Regulator Station at MP 1683.2 and 36.5 miles of greenfield pipeline in Lancaster County, PA, including 1.8 miles in Drumore Township
EN-2	Eastern Shore 2017 Expansion Project (CP17-28)	The Eastern Shore 2017 Expansion Project is a natural gas transmission expansion project that increase capacity by 95,000 Dth/d. The project consists of approximately 40 miles of natural gas pipeline, upgrades to an existing meter and regulator station, installation of an additional compressor unit at an existing compressor station, and the addition of two pressure control stations.	PA, MD, DE	11.0 miles east of the Quarryville Loop	Placed in-service December 2017, restoration underway	40 miles of pipeline, including 13.3 miles of looping in Chester County, PA
EN-3	New York Bay Expansion Project (CP15-527)	The New York Bay Expansion Project is a natural gas transmission expansion project that increased natural gas capacity on the Transco system to the New York market by 115,000 Dth/d. The project included uprating a gas-fired compressor at Compressor Station 200; adding electric-driven compression at Compressor Station 207; replacing 0.25 mile of the Lower New York Bay Lateral Loop C in three short segments between MPs 10.0 – 10.5; minor modifications at the Morgan M&R Station; and other minor modifications and appurtenant facilities.	PA, NJ, NY	Compressor Station 200; Madison Loop (near MP 10.2); Morgan M&R Station	Placed in-service October 2017; restoration underway	Project construction impacted about 66.3 acres including 20.9 acres at Compressor Station 200, 24.0 acres at Compressor Station 207, 14.1 acres along Lower New York Bay Lateral Loop C, and 1.3 acres at the Morgan M&R Station. Project operation affected less than 1.0 acre.

TABLE 4.12.1-3 (cont'd)

Present and Future Actions within the Cumulative Geographic Scope and Temporal Extent

ID	Type/Action Name	Description	General Location	Location Relative to the NESE Project	Timing [a]	Estimated Scale
EN-4	Pennsylvania Pipeline/ Mariner East II Project	The Mariner East II Project will expand Sunoco's existing natural gas liquids pipeline system to provide an additional 350,000 barrels per day to eastern Pennsylvania markets. The project consists of 16-inch- and 20-inch-diameter pipeline in an existing corridor across 17 counties in southern PA.	OH, WV, PA	0.8 mile southwest of CS 200	Under construction, planned in-service 2020	306 miles of pipeline, including about 25 miles in Chester County, PA
EN-5	Middlesex Energy Center	Construct and operate a new 560-megawatt combined cycle power plant.	Sayreville, Middlesex County, NJ	2.1 miles west of the Madison Loop	Unknown	9 acres
EN-6	Poseidon Electric Transmission Line	The Poseidon Electric Transmission Line Project consists of a 500 MW electric transmission line from South Brunswick, NJ to Melville, NY. The project will include 56 miles of onshore line and 22 miles of offshore line and will be buried underground and below the seafloor. The offshore cable is proposed to be installed using a jet plow.	NJ, NY	Would cross Raritan Bay Loop near MP 14 and then parallel Transco's Lower New York Bay Lateral	Initially proposed in-service 2020; timing currently unknown	78 miles of onshore and offshore electric transmission line
EN-7	Sewaren Generating Station	Power plant with capacity for 540 megawatt combined-cycle, dual-fuel (natural gas or fuel oil) replacing older generating units.	NJ	23 miles northeast of Compressor Station 206 [b]	Operation in time for summer of 2018	12 acres
TRANSPORTATION PROJECTS						
TR-1	Peters Creek Road Bridge Restoration	Bridge restoration/replacement on Peters Creek Road over Peters Creek.	Lancaster County, PA	4.9 miles southeast of the Quarryville Loop	2018-2019	2 acres
TR-2	South Lime Street Bridge	Bridge replacement at South Lime Street over a tributary to the South Fork of Beaver Creek.	Lancaster County, PA	0.7 mile north of the Quarryville Loop	2020	<1 acre
TR-3	U.S. Highway 9, Bordentown Avenue, Kenneth Avenue Improvements	Construct safety and operational improvements.	Middlesex County, NJ	0.8 mile north of the Madison Loop	Unknown	4 acres
TR-4	South Amboy Intermodal Transportation Center	Construct an intermodal transportation station that serves combined rail, bus, ferry, auto and pedestrian traffic in South Amboy.	Middlesex County, NJ	1.1 miles north of the Madison Loop	Unknown	41 acres
TR-5	Raritan River Drawbridge Replacement	Replace the Raritan River Drawbridge on the North Jersey Coast Line between Perth Amboy and South Amboy with a lift bridge.	Middlesex County, NJ	1.7 miles northwest of the Madison Loop	2019	2 acres
TR-6	Garden State Parkway Interchange 125 Reconstruction	Construct a new interchange on Garden State Parkway at milepost 125, including four new ramps to and from the parkway.	Middlesex County, NJ	2.2 miles northwest of the Madison Loop	2016-2018	30 acres
TR-7	U.S. Highway 9, New Jersey Route 35, and Main Street Interchange Reconstruction	Reconstruct the interchange to improve traffic flow and access.	Middlesex County, NJ	2.2 miles northwest of the Madison Loop	2021-2022	25 acres

TABLE 4.12.1-3 (cont'd)

Present and Future Actions within the Cumulative Geographic Scope and Temporal Extent

ID	Type/Action Name	Description	General Location	Location Relative to the NESE Project	Timing [a]	Estimated Scale
TR-8	New Jersey Route 18 Drainage and Pavement Rehabilitation	Reconstruct and resurface about 4 miles of New Jersey Route 18 and mitigate flood and drainage problems in East Brunswick Township.	Middlesex County, NJ	3.4 miles west of the Madison Loop	2018-2019	4 miles of roadway
RESIDENTIAL PROJECTS						
RS-1	Swedesford Townhomes	Construct 66 townhome units in East Whiteland Township.	Chester County, PA	<0.1 mile southeast of CS 200	Unknown	16 acres
RS-2	Townes at Malvern	Construct 64 townhomes and 2 single family homes in East Whiteland Township.	Chester County, PA	0.8 mile southeast of CS 200	Unknown	10 acres
RS-3	Glen Loch II Subdivision	Construct 108 duplex and townhome units in East Whiteland Township.	Chester County, PA	1.2 miles south of CS 200	Unknown	56 acres
RS-4	Marquis at Exton	Construct 240 apartment units in West Whiteland Township.	Chester County, PA	2.8 miles southwest of CS 200	Unknown	22 acres
RS-5	Atwater Crossing	Construct a 3- to 5-story residential care facility for older persons with approximately 250 units in Tredyffrin Township.	Chester County, PA	3.1 miles east of CS 200	Unknown	34 acres
RS-6	Parkview at Oaklands	Construct 276 apartments in West Whiteland Township.	Chester County, PA	3.4 miles southwest of CS 200	Unknown	37 acres
RS-7	Wilson Farm Senior Housing	Construction 75 affordable senior housing units in South Brunswick Township.	Middlesex County, NJ	1.3 miles northeast of CS 206	Unknown	10 acres
RS-8	East Meadow Estates	Construction of 55 single-family detached homes in South Brunswick Township.	Middlesex County, NJ	3.1 miles northeast of CS 206	Unknown	27 acres
RS-9	La Mer Residential Development	Expand an existing development to include about 135 new townhome units in Sayreville.	Middlesex County, NJ	Intersects the Madison Loop at about MP 11.0	Under construction	22 acres
RS-10	Windermere Townhome Development	Expand an existing development to include about 74 new townhome units in Sayreville.	Middlesex County, NJ	150 feet south of the Madison Loop at about MPs 11.3 to 11.4	Under construction	14 acres
RS-11	Alfieri Residential Development	Construct 529 apartment units along Matawan Road near Garden State Parkway Exit 120 in South Amboy.	Middlesex County, NJ	1.5 miles southeast of the Madison Loop	Unknown	94 acres
RS-12	Garden Grove on Nine Residential Development	Construct 120 apartment units in 5 three-story buildings along Old Bridge Matawan Road near Highway 9 in Browntown.	Middlesex County, NJ	2.5 miles south of the Madison Loop	Unknown	16 acres
COMMERCIAL/INDUSTRIAL PROJECTS						
CI-1	Poultry Barn Construction	Construct a poultry barn.	Lancaster County, PA	1 mile southeast of the Quarryville Loop	Unknown	2 acres
CI-2	Great Valley Community Organization Recreational Facility	Construct a recreational facility and outdoor playing fields in East Whiteland Township.	Chester County, PA	0.2 mile southeast of CS 200	2017-2018	8 acres
CI-3	Whiteland Village Mixed Use Development	Construct a continuing care retirement community with office space, retail, and residential units in East Whiteland Township.	Chester County, PA	0.8 mile east of CS 200	Unknown	75 acres

TABLE 4.12.1-3 (cont'd)

Present and Future Actions within the Cumulative Geographic Scope and Temporal Extent

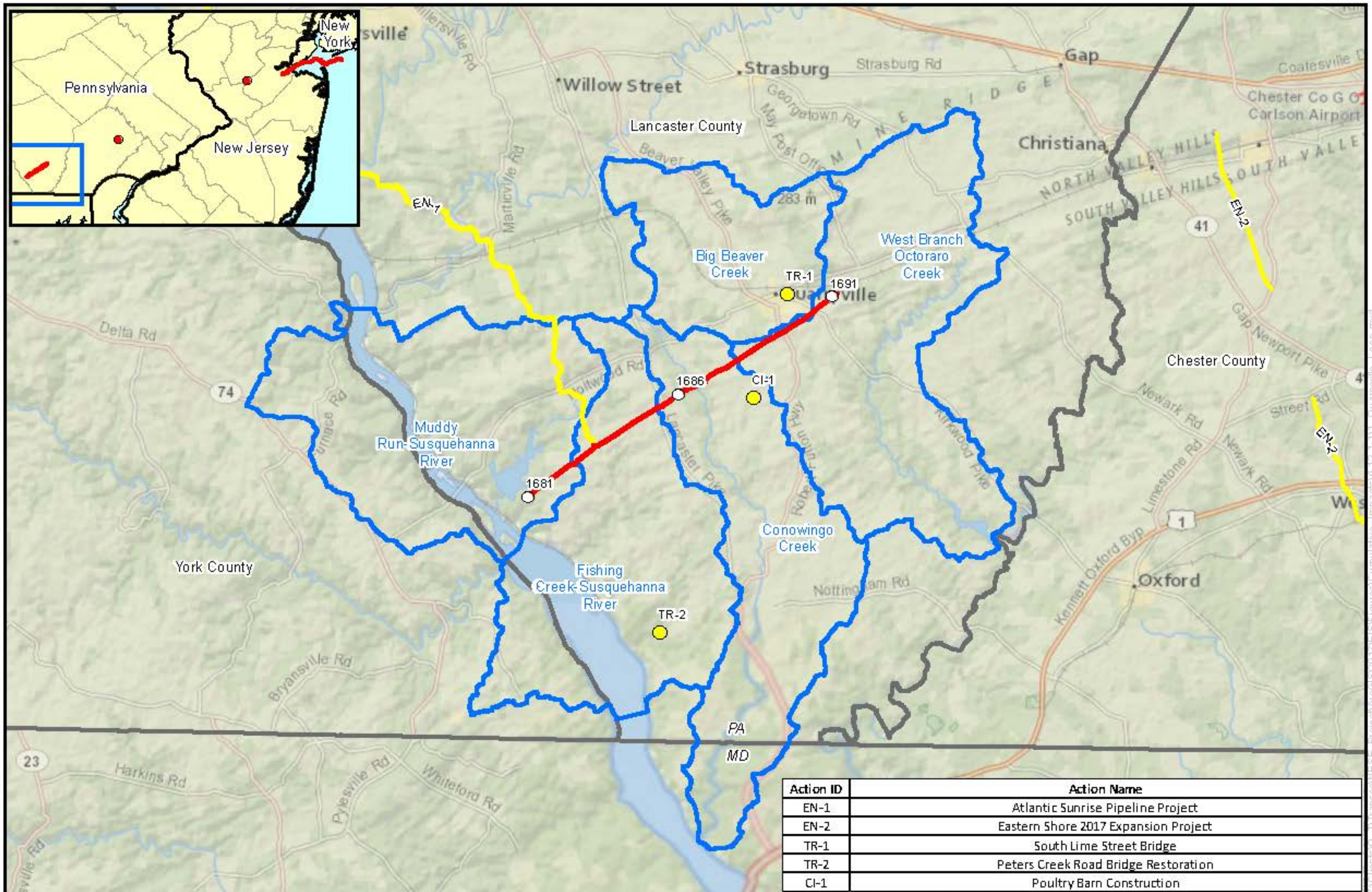
ID	Type/Action Name	Description	General Location	Location Relative to the NESE Project	Timing [a]	Estimated Scale
CI-4	Exton Square Mall Parking Lot Expansion	Expand commercial garage and parking lot to accommodate 263 additional parking spaces in East Whiteland Township.	Chester County, PA	2 miles southwest of CS 200	Unknown	10 acres
CI-5	Atwater Lot 13 Commercial Development	Unspecified commercial development in East Whiteland Township.	Chester County, PA	2.8 miles east of CS 200	Unknown	35 acres
CI-6	Great Valley Corporate Center	Expand existing corporate center to include over 800,000 square feet of additional office space, 25,000 square feet of additional retail space, 600 residential units, and road improvements.	Chester County, PA	2.9 miles east of CS 200	Unknown	82 acres
CI-7	Atwater Commercial Development	Commercial development featuring commercial, hotel, and restaurant space in East Whiteland Township.	Chester County, PA	3.2 miles northeast of CS 200	Unknown	11 acres
CI-8	Veronica Crossings	F. Greek Development is proposing a 122,350 square-foot industrial building and 86,000 square foot flex-industrial building on two lots.	Somerset County, NJ	7.1 miles northeast of CS 206	2016	16 acres
CI-9	Hamilton Commons	Mixed-use development featuring 25,450 square feet of commercial space and 60 living units in Franklin Township.	Somerset County, NJ	8.8 miles northeast of CS 206	Unknown	2 acres
CI-10	Engel Burman at Somerset Mixed-Use Development	Mixed-use development featuring 100,000 square feet of commercial and residential space with 126 living units and 278 parking spaces.	Somerset County, NJ	10 miles north of CS 206	Unknown	17 acres
CI-11	Riverton	Construct a mixed-use development, including 1 million square feet of retail space, 1 million square feet of office space, 2,000 luxury residential units, 2 hotels and 1 marina in Sayreville.	Middlesex County, NJ	2.4 miles northwest of the Madison Loop	2021 completion	419 acres
CI-12	Recon Services Mixed-use Development	Mixed-use development featuring 9,250 square feet of commercial and 84 apartment units.	Middlesex County, NJ	8.5 miles northwest of the Madison Loop	Unknown	1 acres
BEACH & SHORELINE MANAGEMENT PROJECTS						
BR-1	Raritan and Sandy Hook Bay-Port Monmouth Hurricane and Storm Damage Reduction	Construction of about 7,100 feet of levees, 3,600 feet of floodwalls, 2,600 feet of dunes, and beach nourishment in Monmouth.	Middlesex County, NJ	4.3 miles south of the Raritan Bay Loop	Unknown	8 acres
BR-2	South Shore of Staten Island Coastal Storm Risk Management Project	Construction of buried seawall/armored levee along a majority (approximately 5.3 miles) of the Fort Wadsworth – to Oakwood Beach reach.	Richmond County, NY	3.7 miles north of the Raritan Bay Loop	March 2019-June 2022	243 acres
BR-3	Living Breakwaters Project	Construction of an approximately 3,000- to 4,000-foot system of near-shore breakwaters, 730 to 1,200 feet from shore (with oyster cultivation activities); shoreline restoration; and a public facility for educational and community programs	Richmond County, NY	1.3 miles north of the Raritan Bay Loop	2018-2020	Up to 0.8 mile of offshore breakwaters; 0.2 mile of onshore shoreline restoration

TABLE 4.12.1-3 (cont'd)

Present and Future Actions within the Cumulative Geographic Scope and Temporal Extent

ID	Type/Action Name	Description	General Location	Location Relative to the NESE Project	Timing [a]	Estimated Scale
CHANNEL DREDGING PROJECTS						
CD-1	New York Harbor Maintenance Dredging	Maintenance dredging of about 31 miles of existing shipping channels within the New York Harbor Complex. Maintenance activities are ongoing and are based on available funding. As discussed in section 2.3.3.10, Transco would obtain supplemental offshore backfill material from one or more existing commercial vendors that currently operate under active permits to dredge the Ambrose Channel covered under this present and future action.	Union, Middlesex, and Monmouth Counties, NJ; Richmond County, NY	Intersects the Raritan Bay Loop at MPs 17.6, 25.0 and 30.0	Unknown	31 miles of shipping channels
CD-2	Great Kills Harbor Dredging	Maintenance dredging of an existing 150-foot-wide by 10,000-foot-long section of channel. The entire channel generally would not require maintenance dredging; only areas where shoaling has reduced channel depth would require dredging.	Richmond County, NY	0.3 mile north of the Raritan Bay Loop	Unknown	35 acres
CD-3	Jamaica Bay at Rockaway Inlet Dredging	Maintenance dredging of an existing 1,000-foot-wide by 9,000-foot-long entrance channel to Jamaica Bay. connecting two interior channels with deep water in the Atlantic Ocean. Maintenance activities are ongoing and are based on available funding.	Queens and King Counties, NY	2.2 miles north of the Raritan Bay Loop	Unknown	518 acres
CD-4	Sandy Hook Bay at Leonardo Dredging	Maintenance dredging of an existing 150-foot-wide by 2,500-foot-long channel in Sandy Hook Bay, NJ.	Monmouth County, NJ	5 miles southwest of the Raritan Bay Loop	Unknown	8 acres
CD-5	East Rockaway Inlet Maintenance	Maintenance dredging of an existing 250-foot-wide by 5,000-foot-long section of channel with the placement of dredged sand on Rockaway Beach, NY for shoreline restoration.	Queens County, NY	6.3 miles northeast of the Raritan Bay Loop	Unknown	31 acres

[a] The specific timing of construction for many projects is unknown, but potentially could be coincident with the NESE Project.
[b] The Sewaren Generating Station is not depicted on figure 4.12.1-1.



Action ID	Action Name
EN-1	Atlantic Sunrise Pipeline Project
EN-2	Eastern Shore 2017 Expansion Project
TR-1	South Lime Street Bridge
TR-2	Peters Creek Road Bridge Restoration
CI-1	Poultry Barn Construction

0 2 4 Miles

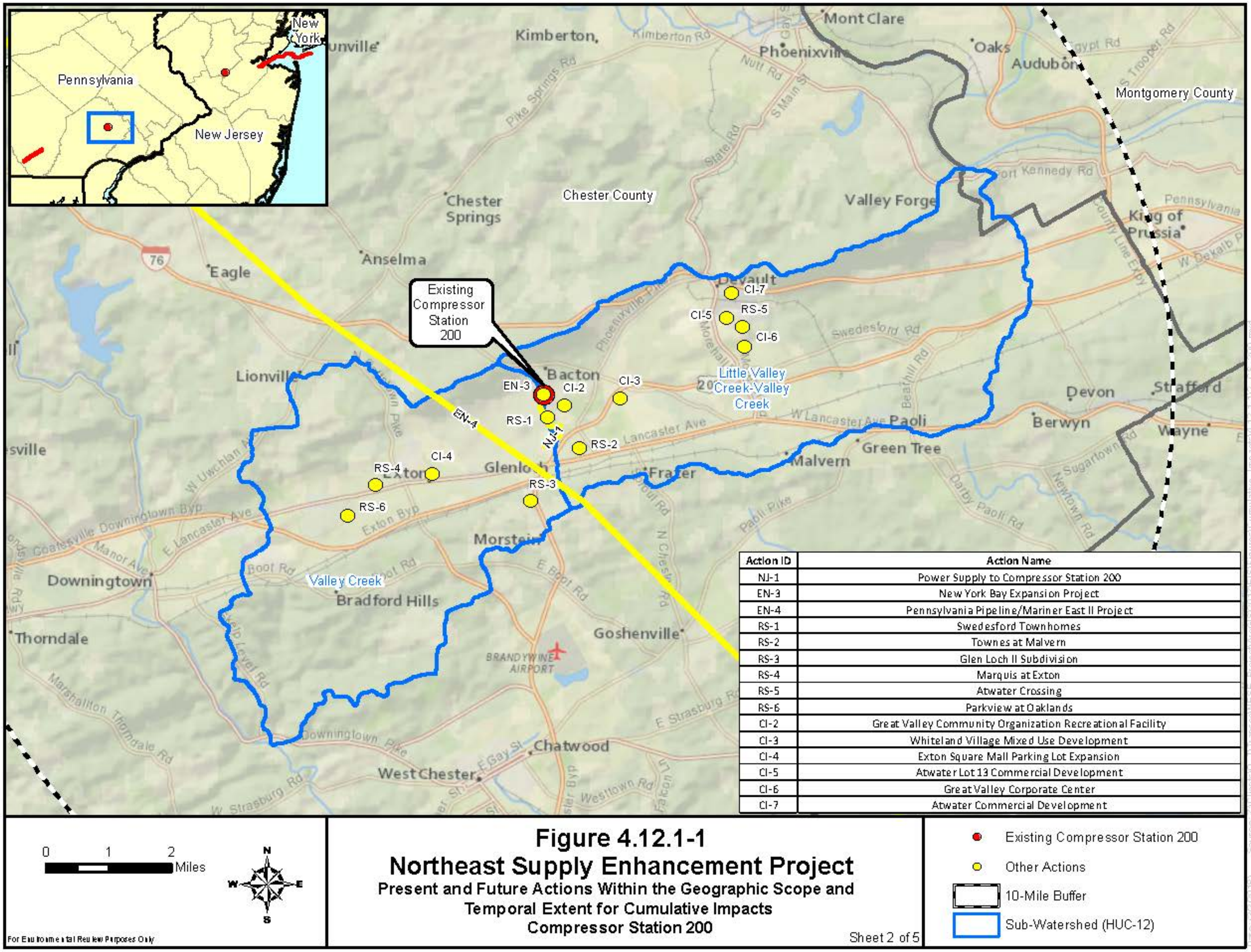
N W E S

For Environmental Review Purposes Only

Figure 4.12.1-1
Northeast Supply Enhancement Project
Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts
Quarryville Loop

Sheet 1 of 5

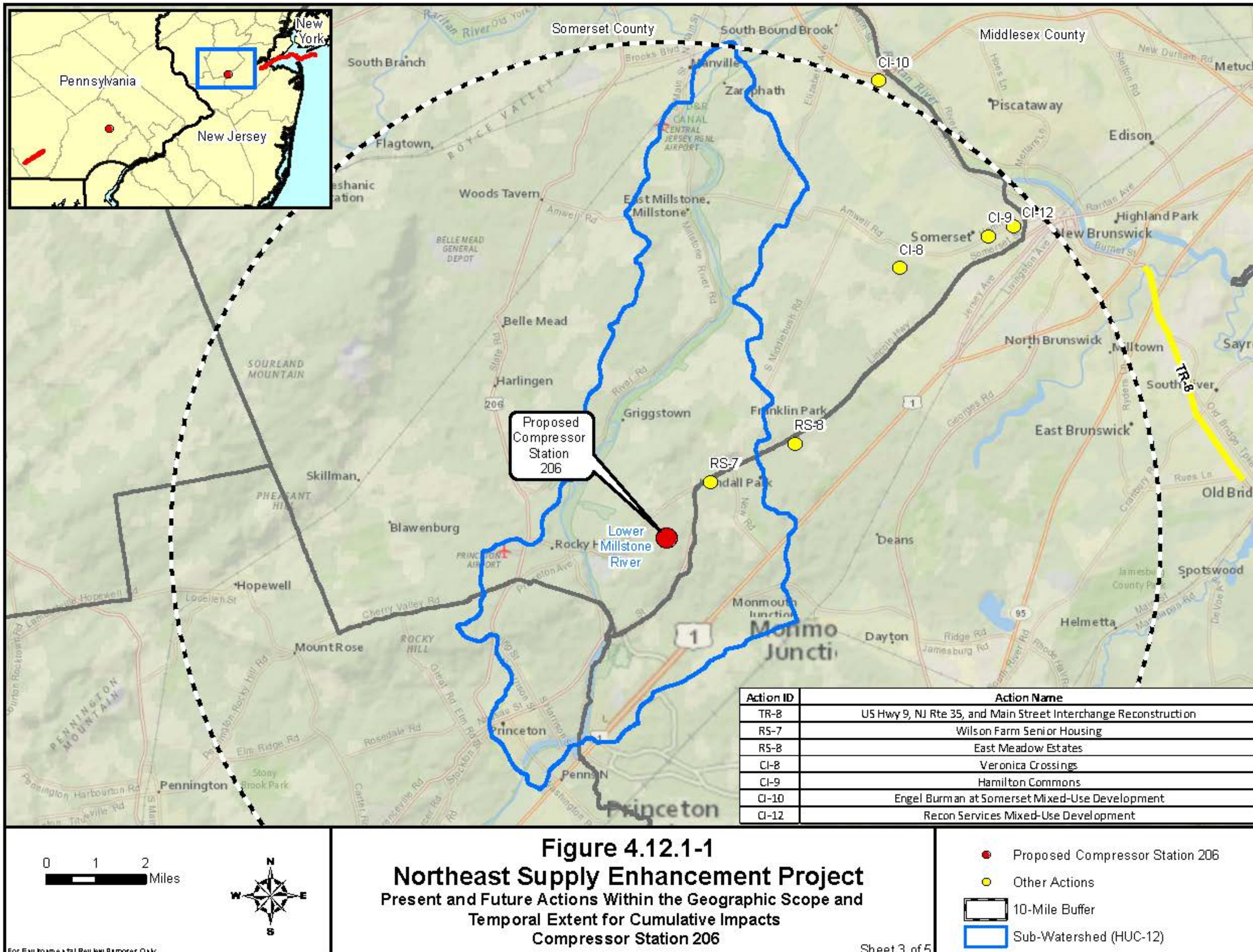
Proposed Quarryville Loop
Milepost
Other Actions
Sub-Watershed (HUC-12)



Action ID	Action Name
NJ-1	Power Supply to Compressor Station 200
EN-3	New York Bay Expansion Project
EN-4	Pennsylvania Pipeline/Mariner East II Project
RS-1	Swedesford Townhomes
RS-2	Townes at Malvern
RS-3	Glen Loch II Subdivision
RS-4	Marquis at Exton
RS-5	Atwater Crossing
RS-6	Parkview at Oaklands
CI-2	Great Valley Community Organization Recreational Facility
CI-3	Whiteland Village Mixed Use Development
CI-4	Exton Square Mall Parking Lot Expansion
CI-5	Atwater Lot 13 Commercial Development
CI-6	Great Valley Corporate Center
CI-7	Atwater Commercial Development

Figure 4.12.1-1
Northeast Supply Enhancement Project
Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts
Compressor Station 200

Sheet 2 of 5



Action ID	Action Name
TR-8	US Hwy 9, NJ Rte 35, and Main Street Interchange Reconstruction
RS-7	Wilson Farm Senior Housing
RS-8	East Meadow Estates
CI-8	Veronica Crossings
CI-9	Hamilton Commons
CI-10	Engel Burman at Somerset Mixed-Use Development
CI-12	Recon Services Mixed-Use Development

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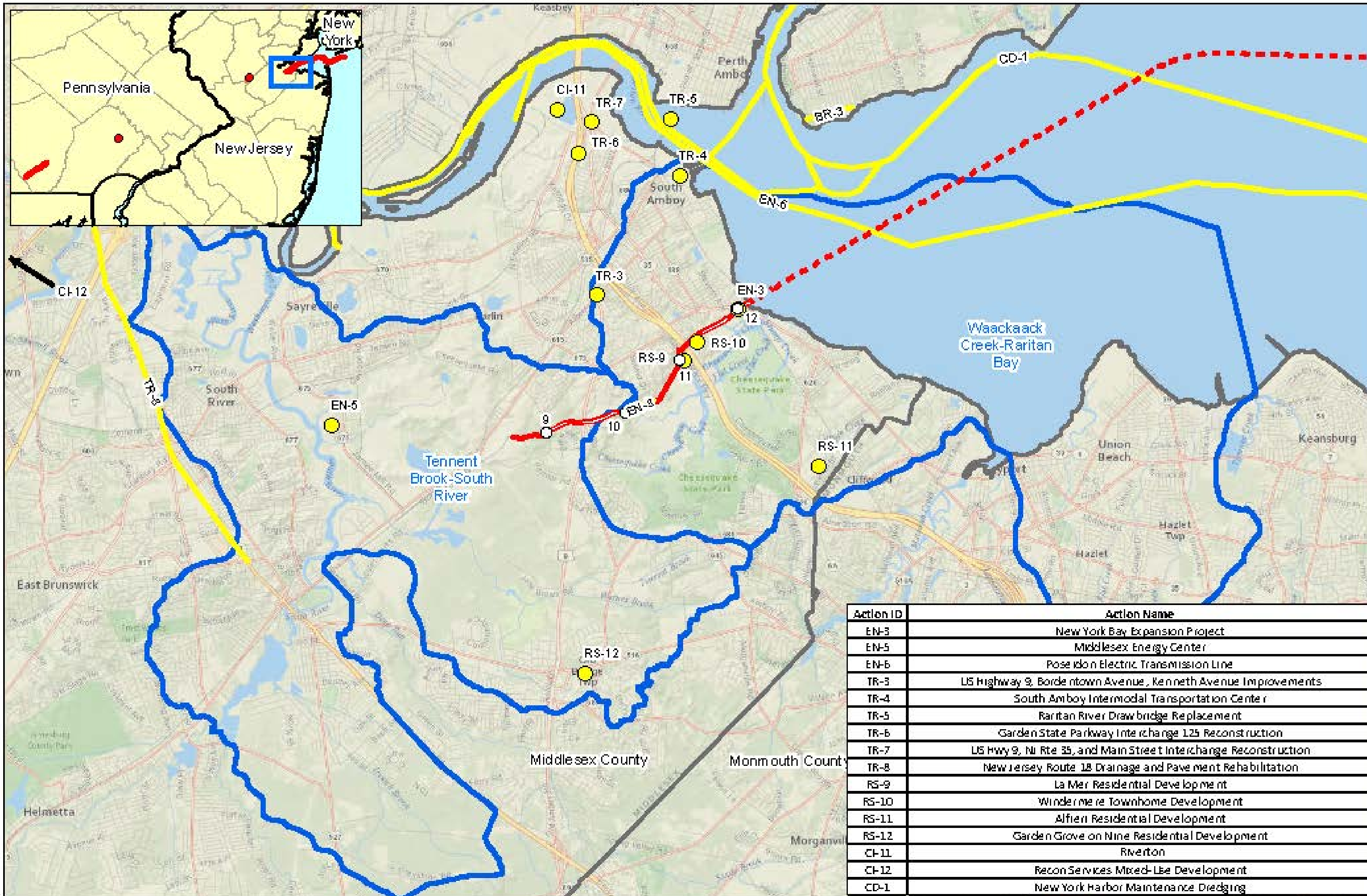
Figure 4.12.1-1
Northeast Supply Enhancement Project
Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts
Compressor Station 206

Sheet 3 of 5

Proposed Compressor Station 206
Other Actions
10-Mile Buffer
Sub-Watershed (HUC-12)



Action ID	Action Name
EN-3	New York Bay Expansion Project
EN-5	Middlesex Energy Center
EN-6	Poseidon Electric Transmission Line
TR-3	US Highway 9, Bordentown Avenue, Kenneth Avenue Improvements
TR-4	South Amboy Intermodal Transportation Center
TR-5	Raritan River Drawbridge Replacement
TR-6	Garden State Parkway Interchange 125 Reconstruction
TR-7	US Hwy 9, NJ Rte 35, and Main Street Interchange Reconstruction
TR-8	New Jersey Route 18 Drainage and Pavement Rehabilitation
RS-9	La Mer Residential Development
RS-10	Windermere Townhome Development
RS-11	Alfieri Residential Development
RS-12	Garden Grove on Nine Residential Development
CI-11	Riverton
CI-12	Recon Services Mixed-Use Development
CD-1	New York Harbor Maintenance Dredging

0 1 2 Miles

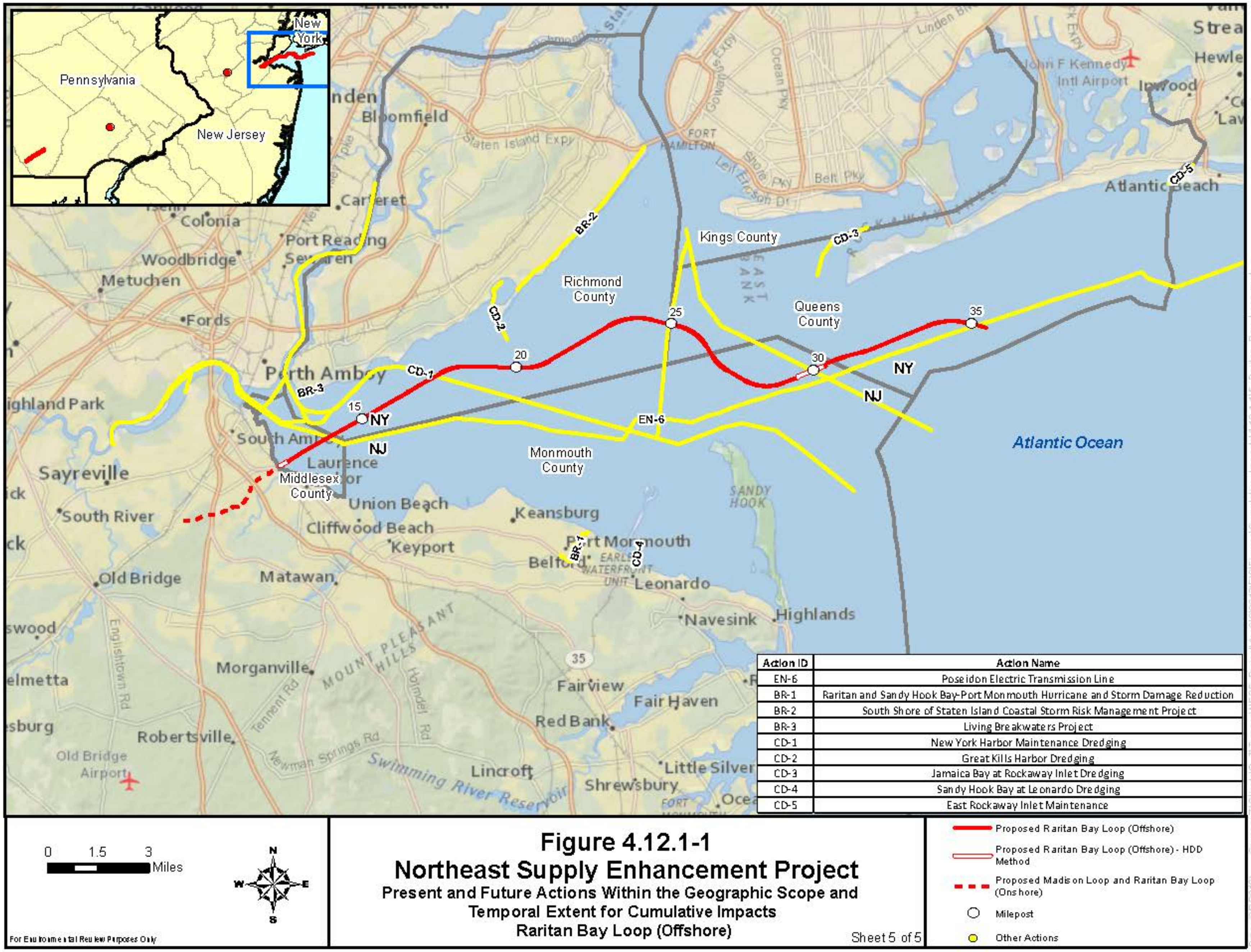
N E S W

For Environmental Review Purposes Only

Figure 4.12.1-1
Northeast Supply Enhancement Project
Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts
Madison Loop and Raritan Loop (Onshore)

Sheet 4 of 5

- Proposed Madison Loop and Raritan Bay Loop (Onshore)
- Proposed Madison Loop and Raritan Bay Loop (Onshore) - HDD Method
- Proposed Raritan Bay Loop (Offshore)
- Milepost
- Other Actions
- Sub-Watershed (HUC-12)



Action ID	Action Name
EN-6	Poseidon Electric Transmission Line
BR-1	Raritan and Sandy Hook Bay-Port Monmouth Hurricane and Storm Damage Reduction
BR-2	South Shore of Staten Island Coastal Storm Risk Management Project
BR-3	Living Breakwaters Project
CD-1	New York Harbor Maintenance Dredging
CD-2	Great Kills Harbor Dredging
CD-3	Jamaica Bay at Rockaway Inlet Dredging
CD-4	Sandy Hook Bay at Leonardo Dredging
CD-5	East Rockaway Inlet Maintenance

Figure 4.12.1-1
Northeast Supply Enhancement Project
Present and Future Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts
Raritan Bay Loop (Offshore)

Sheet 5 of 5

We received comments during scoping that we should evaluate cumulative impacts from the Poseidon Electric Transmission Project, the Empire State Connector Electric Transmission Project, the Neptune Regional Transmission System Cable Project, and the TDI Champlain Hudson Power Express Project. In addition, Transco recently filed an application for the Rivervale South to Market Project (Docket No. CP17-490-000), the nearest facility of which (Linden Yard) would be 7.9 miles north of the Raritan Bay Loop. We considered all five of these actions and determined that only the Poseidon Electric Transmission Cable Project could occur within the geographic and temporal scope for the NESE Project.[51]

We received comments regarding the potential for the NESE Project to lead to the construction of other pipelines, and regarding potential impacts if the Raritan Bay Loop is abandoned. Transco has not identified any plans to expand or abandon the proposed facilities and, as such, we considered these actions as too speculative to include in our cumulative impacts analysis. In addition, any plans to expand the proposed facilities would be subject to FERC review under section 7(c) of the NGA or FERC's implementing regulations in 18 CFR 2.55 and 18 CFR 157, and plans to abandon the facilities would be subject to FERC review under section 7(b) of the NGA.

Commenters also recommended that we analyze the cumulative impacts that operating Compressor Station 206 could have on future reclamation of the Trap Rock quarry site. As discussed in section 4.7.4, the Trap Rock site may be turned over to the State of New Jersey and converted into a reservoir and open space at some point after mining operations cease. Because mining is expected to continue for about 30 more years, we considered future reclamation plans as too speculative to include in our cumulative impacts analysis. However, we note that in section 4.7.4 we conclude that operation of Compressor Station 206 would not pose a significant concern to potential future use of the quarry site.

4.12.1.2 Non-jurisdictional Facilities

Non-jurisdictional facilities are those components of an interstate natural gas transmission project that are not under the jurisdiction of the FERC. They may include major facilities that are integral to the overall project objective, or they may be minor components associated with operation of jurisdictional facilities. As described in section 1.4, the non-jurisdictional facilities for the NESE Project include new electric power service to Compressor Station 200 and water and electric power service to Compressor Station 206. Transco is in discussions with the utility providers to provide these services.

PECO Energy Company would provide new electrical service to Compressor Station 200. This new service would require constructing approximately 0.9 mile of electric power line from an existing electric substation to the compressor station. The electric power line would be installed within an existing overhead electric transmission right-of-way that extends from the substation and along the western border of the compressor station. Modification to existing infrastructure would be expected to be minor, potentially requiring replacement or addition of power poles within the existing utility corridor.

Franklin Township would provide potable water service and PSE&G would provide electrical service to Compressor Station 206. These services would originate at existing utilities along County Road 518 and would be installed underground within the maintained right-of-way of the proposed access road to the compressor station, possibly beneath the road. We anticipate that road and utility construction would coincide. Therefore, the impacts associated with the utility service connections and right-of-way maintenance are included in our analysis of the affected environment in the remainder of section 4.0, and are not considered further in this cumulative impact analysis.

[51] Consistent with CEQ guidelines, our discussion of past actions is aggregated into the description of the affected environment. Therefore, only present and reasonably foreseeable future actions are discussed in this section.

4.12.1.3 Unrelated Energy Projects

The energy projects that we identified for consideration in our cumulative impacts analysis include an electric transmission power line; multiple natural gas and natural gas liquids transmission pipelines; and two proposed natural gas-fired electric power plants.

Electric transmission lines carry electricity long distances and begin and end in substations that serve either electric generation or load centers. These transmission lines typically vary from 115 kV to 500 kV. Transmission lines can carry electricity from coal-fired power plants, natural gas generating plants, and wind and solar farms. Transmission line poles or structures usually are between 60 and 140 feet tall. Structures can be metal or wood, single-poled or multi-poled, and single-circuited (carrying one set of transmission lines) or double-circuited (with two sets of lines). Construction and operation of transmission lines requires a linear right-of-way free of trees and other obstructions so that the poles and lines can be installed, accessed, and maintained. New access roads or improvements to existing access roads are frequently required for construction and operation activities. The right-of-way varies in width depending on the easement, the size of the poles, the presence of other nearby utilities, and the land use. With the exception of keeping the right-of-way free of trees and other obstructions, most of the right-of-way can be restored to its preconstruction condition after the electric transmission line is installed. Aboveground transmission lines can typically avoid permanent impacts on environmental resources such as wetlands or waterbodies by spanning them and placing the associated poles outside of these features.

Electric transmission lines also can be installed offshore. Offshore cable lay is the process of installing an electric cable below the seafloor to convey utility services from one side of a waterbody to the other. Cable is usually installed on the seafloor using a lay vessel, often referred to as a cableship. The cableship is a specially modified vessel that carries spooled cable on board and slowly lays it on the seafloor. The cable is then worked into the seafloor using a special underwater plow pulled behind the cableship. The cable is generally buried to a depth of about 3 feet. Smaller vessels and divers may be used instead of cableships to install cable in shallow waters and where it crosses other underwater cables or pipelines.

Transmission pipelines are generally larger diameter pipelines used to transport crude oil, refined petroleum products, and natural gas for long distances, typically across state borders. Transmission pipelines differ from gathering and distribution systems, which are typically smaller diameter facilities used to collect and distribute natural gas or liquid products on a local scale. Other major pipeline components include pump stations for liquids and compressor stations for natural gas that are used to help move the product through the pipe, valves capable of isolating portions of the pipeline should a leak occur, and meter stations where the product is measured before delivery to a customer. Transmission pipelines are buried within a designated right-of-way which can vary in width depending on the easement, the size of pipe, the presence of other nearby utilities, and land use. The construction right-of-way is usually restored to preconstruction conditions, except that the area directly over the pipeline is kept clear of deep-rooted vegetation to allow the pipeline to be safely operated, aerially surveyed, and properly maintained.

Natural gas-fired power plants are used to generate electricity for delivery to the electric grid. Output can range from 10 megawatts to 500 megawatts or more. Electricity is produced by using the energy from natural gas combustion to drive an electrical generator. Many natural gas-fired power plants are duel-fuel, which means they can also combust other fuels, such as ultra-low-sulfur diesel fuel oil, to drive the generator. The purpose of dual-fuel capability is to increase the reliability of power generation in the event one fuel source become limited or too expensive. Many power plants also are combined-cycle facilities, meaning that, in addition to using combustion to drive a generator, the facility also uses waste heat from the combustion process to produce steam for a steam-driven generator. The size of a natural gas-fired power plant depends on several factors, including the terrain at the site, the generating modules to be used, and the desired power output. A typical natural gas-fired power plant site might be 20 to 40 acres in size or larger.

4.12.1.4 Transportation Projects

The transportation projects that we identified for consideration in our cumulative impacts analysis include road and bridge construction and repair, and construction and operation of transportation hub facilities. Most people understand road construction because they frequently encounter it in everyday life. Road construction may involve constructing new roads as well as repairing or reconstructing existing thoroughfares. While constructing new roads typically does not disrupt traffic, road repair and reconstruction often involves shifting or detouring traffic during road work. The workspace required for road construction varies, but is heavily influenced by the type of work being conducted and the size of the road being constructed or repaired. Minor repair projects may be able to confine activities within the existing road bed, whereas major projects may require a wider right-of-way and additional workspace. Most projects in colder climates are completed in the spring, summer, and fall when weather conditions are more suitable for outdoor construction.

Transportation projects also involve construction and operation of transportation hub facilities, such as train stations, bus depots, or park-and-ride lots. Intermodal transportation centers accommodate multiple types (or modes) of transportation at one central location. Intermodal transportation centers may combine rail, bus, ferry, auto, bicycle, and pedestrian transportation service. The size of the center/ depot/station is dependent on the number of people and different modes to be served.

4.12.1.5 Residential Projects

The residential projects that we identified for consideration in our cumulative impacts analysis include developments with single- and multi-family homes, townhomes, condominiums, and apartment buildings. Zoning often dictates the size and density of residential occupation allowed in an area. Residential developments may range from less than 1 acre to over 100 acres. Build-out of large residential projects often occur in phases based on sales and financing, and can take several years to complete.

4.12.1.6 Commercial and Industrial Projects

The commercial and industrial projects that we identified for consideration in our cumulative impacts analysis include constructing retail, commercial, and industrial facilities. Retail, commercial, and industrial projects range from sawmills to poultry barns and elementary schools to warehouses. Zoning often dictates the location of commercial and industrial development. The size of each development varies depending on project specifications but typically range from about 5 acres to over 100 acres. Some retail, commercial, or industrial projects may be “mixed use,” meaning they include combinations of uses within the development project.

4.12.1.7 Beach and Shoreline Management Projects

The beach and shoreline management projects that we identified for consideration in our cumulative impacts analysis generally involve replenishing sand, building dunes, reinforcing groins, building onshore and offshore seawalls and breakers, and planting vegetation on beaches where land has been lost from of coastal erosion and development. Management projects also may involve repairing deteriorated piers, removing abandoned structures, and constructing levees and floodwalls. Individual management projects are usually part of larger environmental and economic plans to protect, preserve, and restore important shoreline resources. The size of the individual projects vary depend on the importance of the environmental and/or economic resources to be protected, the severity and magnitude of degradation to be repaired, the types of mitigation measures to be implemented, and the financial capability of the project sponsor.

4.12.1.8 Dredging Projects

The dredging projects that we identified for consideration in our cumulative impacts analysis involve excavating seafloor sediments to create or maintain a navigable pathway for seafaring vessels. Maritime businesses depend on shipping channels to maintain access to port facilities. Once a navigation channel is created it is often necessary to periodically remove sediment that naturally accumulates in the channel by conducting maintenance dredging. Dredging is accomplished using various ship-borne equipment that removes sediment by mechanical or vacuum methods. These sediments can be side-cast or loaded aboard barges and disposed of in permitted onshore or offshore locations. Today, dredged material is often transported to land where it is reused in beneficial ways, such as for brownfield reclamation, habitat restoration, or beach replenishment. As discussed in section 2.3.3.10, Transco would obtain suitable material that is commercially obtained from the Ambrose Channel seaward of the Raritan Bay Loop to fulfill all Project needs for offshore supplemental backfill. This material would be acquired from one or more existing commercial vendors that currently operate under active permits to dredge the Ambrose Channel.

4.12.2 Background on the Existing Environment

All areas that would be affected by the NESE Project have been altered by human activity, currently ranging from predominantly agricultural land use along the Quarryville Loop to urban commercial, residential, and industrial development along the Madison Loop and near Compressor Stations 200 and 206. The Raritan Bay Loop would also cross the entry into one of the most active ports in the world.

Europeans entered the Americas about 500 years ago, and within a few centuries, exploration and colonization resulted in significant changes in the population, landscape, flora, and fauna of the region. For example, when Europeans first settled in Pennsylvania, about 90 to 95 percent of the state was forested (DeCoster, 1995). However, by the end of the 1800s, much of Pennsylvania's native forests had been cut down by industrial logging operations and consumed by wildfires. Large expanses of treeless land became common and the amount of forested land was down to 36 percent (PADCNR, 2016; DeCoster, 1995). As a result of subsequent conservation efforts, about 60 percent of Pennsylvania is forested today (PADCNR, 2016). New York and New Jersey were similarly affected. Although New York and New Jersey originally were not as heavily forested, the forests that were present were decimated by the late 1800s (NYSDEC, 2017e; Pierson et al., 2010). Conservation and land use planning have also assisted in forest recovery in New Jersey and New York. Although the region has been significantly affected by human activity, valuable natural resources remain.

Prior to European settlement, the waters supported a myriad of oyster, crab, fish, shellfish, and other aquatic life (USGS, 2017c). Native Americans used these waterways for sustenance and travel. Since that time, the area has been developed into one of the most active commercial and industrial ports in the world (USACE, 2016). A number of shipping channels (such as the Ambrose and Chapel Hill channels), electric transmission and communication cables (such as the Neptune cable), and pipelines (such as the Lower New York Bay and Rockaway laterals) crisscross the bays. By the mid-1900s, the waters had been exposed to dredging, erosion, runoff, invasive species, sedimentation, sewer discharge, industrial waste, spills, and over-fishing and shellfishing, which significantly degraded the waters (USGS, 2017c). Recent environmental efforts have helped the waters recover, although current conditions still reflect a substantially altered environment (USGS, 2017c). Today, the USACE and other jurisdictions routinely dredge shipping channels in the harbor, and recreation and commercial fishing and shellfishing occur in the waters.

Approximately 41.5 million people now reside in New York, New Jersey, and Pennsylvania (U.S. Census Bureau, 2017). More specific to the NESE Project, about 1.1 million people live in Lancaster and Chester Counties, Pennsylvania, and about 1.2 million people live in Somerset and Middlesex Counties, New Jersey. Pennsylvania, New Jersey, and New York have a combined annual gross domestic product of approximately $2.8 trillion based heavily in finance and insurance; real estate and rental and leasing; health care and social assistance; professional, scientific, and technical services; wholesale trade; and government work (BEA, 2017). The Port of New York and New Jersey, which includes Raritan Bay and Lower New York Bay, is one of the highest-volume ports in the world (USACE, 2016). In 2016, the port traded over 79.8 million metric tons of cargo valued at about $187.8 billion (NYNJPA, 2017).

4.12.3 Potential Cumulative Impacts of the Proposed Action on Resources

4.12.3.1 Geology

Onshore

Project activities such as grading, trenching, and backfilling would result in minor alteration of surficial geology within the Project workspace, and HDD activities would physically alter geologic materials along a very narrow subsurface drill path. Other actions in the Project vicinity could also impact geology, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. Therefore, the geographic scope for cumulative impacts on geology would be the Project workspace. Also, Project effects on geology would be largely limited to the duration of construction; therefore, the temporal extent for most cumulative impacts on geology would be temporary. Notable exceptions would occur where bedrock or significant paleontological resources would be disturbed. Impacts on these resources would be permanent because they could not be restored to their preconstruction condition once they have been altered.

Five other actions could occur within the geographic scope and temporal extent for cumulative impacts on geologic resources (see table 4.12.3-1).

TABLE 4.12.3-1

Other Actions Within the Geographic Scope and Temporal Extent for Onshore Geology Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Approximate Size of Other Actions within the Geographic Scope (acres)
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.2	2.4
COMPRESSOR STATION 200		
Power Supply to Compressor Station 200 (NJ-1)	At CS 200	<0.1
New York Bay Expansion Project (EN-3)	At CS 200	20.9
MADISON & RARITAN BAY LOOPS		
New York Bay Expansion Project (EN-3)	Madison Loop MP 10.0 – 10.5; Morgan M&R Station	39.4
La Mer Residential Development (RS-9)	MP 11.0	4.2
Windermere Townhome Development (RS-10)	MP 11.3	2.8

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
RS = Residential Project

The other actions within the geographic and temporal scope for geology cumulative impacts would involve surficial disturbance of unconsolidated materials and, thus, would not substantially alter the structural elements of the earth. Therefore, significant cumulative impacts on geology, including bedrock formations, would not be expected. Although there are five surface mines within 0.25 mile of the Project area, none intersect the Project workspace or are within the cumulative geographic scope. Therefore, there would be no cumulative impacts on geology associated with mineral resources. Additional discussion of the Project relative to nearby mines is included in sections 4.1.3 and 4.1.6.

The Project, in conjunction with other actions, could trigger a geologic event that could compromise public safety and damage property. As discussed in section 4.1.4.1, the area crossed by the Project is not susceptible to seismic hazards or landslides. However, the eastern 0.4 mile of the Quarryville Loop crosses kart terrain and Compressor Station 200 overlies an area identified as potentially containing karst features. Karst-related ground subsidence could be initiated by the Project and other actions where they involve ground disturbing activities or where they divert or discharge water into otherwise stable karst features. All other actions we considered for potential cumulative impacts are more than 5 miles away from the karst terrain on the eastern end of the Quarryville Loop; thus, there would be no cumulative impact on karst activity associated with the Quarryville Loop. The non-jurisdictional modification of the existing electric power service to Compressor Station 200 would cross karst terrain, and Transco's recent activities at the station associated with the New York Bay Expansion Project also occurred over the karst terrain at the site but did not trigger a karst incident. As indicated in section 4.1.6, Transco conducted geophysical and geotechnical investigations to further assess the potential for karst activity to impact the eastern terminus of the Quarryville Loop or the planned expansion at Compressor Station 200. The additional investigation did not identify a risk for karst activity to affect the Quarryville Loop, but subsurface anomalies that could represent karst features were identified at Compressor Station 200. Transco concluded that the anomalies would not pose a direct risk to building foundations but would implement measures to minimize the potential for karst activity to occur at the site (see section 4.1.6). However, based on the relatively minor scope of construction associated with the electric service modification and compression uprate; the limited spatial overlap of the actions; Transco's statement that Compressor Station 200 has not been affected by karst activity during more than 50 years of operation; and considering that Transco would implement the construction techniques and measures to manage construction stormwater and restore surface contours after construction, the potential for these actions to collectively trigger a significant karst event is low.

Portions of the Project in New Jersey occur in areas that have potential to contain significant paleontological resources, but the likelihood of finding significant fossils in the near-surface, unconsolidated geologic materials that would be encountered during construction is low (see section 4.1.5). No significant paleontological resources were discovered during construction of the New York Bay Expansion Project, and the other ground disturbing activities in this area of New Jersey, including the two residential developments on the Madison Loop, have a similar, low potential to affect paleontological resources. Thus, significant cumulative impacts on paleontological resources would not be expected. Further, to minimize the impact of the Project, Transco would adhere to its Unanticipated Discovery Plan for Paleontological Resources (see table 2.3-3). This plan requires construction to be stopped in an area if unexpected paleontological resources are discovered and the NJGWS to be contacted to determine the significance of the find.

Offshore

Offshore construction of the NESE Project would involve shallow trenching and excavation within unconsolidated sediments, and the HDD installations would only affect unconsolidated geologic material along a very narrow subsurface drill path. Thus, the NESE Project would result in only minor alteration to offshore geology in those areas directly affected by construction, and the temporal extent of cumulative impacts on geology would be temporary. In addition, the offshore environment in Raritan and Lower New York Bay is not subject to geologic hazards, and construction and operation of the Raritan Bay Loop would not affect mineral resource recovery operations or impact significant paleontological resources. Two of the offshore projects identified in table 4.12.1-3, the Poseidon Electric Transmission Line and New York Harbor

Maintenance Dredging, would cross the proposed Raritan Bay Loop, but would only involve shallow disturbance of seafloor sediments. The exact timing of the Poseidon Electric Transmission Line project is not known. As discussed in section 2.3.3.10, Transco would utilize dredge material for supplemental backfill of the Raritan Bay Loop that is obtained as part of the ongoing New York Harbor Maintenance Dredging action. The activities associated with this action have been subject to a previous environmental review by the USACE, and the dredging activities would be conducted in accordance with existing permit conditions. Therefore, no cumulative impact on offshore geologic resources would occur.

4.12.3.2 Soils

Onshore

Project activities such as clearing, grading, and trenching could impact soils through erosion, compaction, soil mixing, accidental spills of hazardous materials within the Project workspace, or by the installation of impervious surfaces (e.g., new buildings, permanent access roads). Other actions in the Project vicinity also could impact soils, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. As discussed in section 4.2.1.4, Project effects on soils would be confined to the Project workspace because Transco's Plan and Procedures would inhibit soil movement offsite during and after construction. Therefore, the geographic scope for cumulative impact on soils would be the Project workspace. Also, as discussed in section 4.2.1.4, the temporal extent for most cumulative Project effects on soils would be temporary because Transco would implement its Plan and Procedures, including topsoil segregation and replacement, to stabilize and restore soils to preconstruction conditions. The exception to this would be where new aboveground structures or impervious surfaces are constructed, which would result in permanent impacts on soil resources. However, the impacts associated with these features would be minor given the area affected in relation to the amount of pervious soils in the area.

Five other actions occur within the geographic scope and temporal extent for soil cumulative impacts. These are the same five actions associated with geology cumulative impacts (see table 4.12.3-1). Together, these five actions would result in about 70 acres of soil disturbance within the geographic scope, of which 62.7 acres (90 percent) are associated with other projects under FERC jurisdiction where measures to minimize impacts on soils have been and will be required. We anticipate that proponents of the other actions would also be required to implement measures to minimize erosion and stabilize soils. For these reasons, we conclude that there would be no significant cumulative impacts on soils.

Offshore

Cumulative impacts on seafloor sediments are discussed in section 4.12.3.4.

4.12.3.3 Groundwater

Onshore

Project activities such as clearing, grading, trenching, backfilling, drilling, dewatering, and refueling could impact groundwater quality and flow, primarily in areas where groundwater occurs within excavation depth. Because the NESE Project generally involves surficial and shallow earthwork, we assumed that Project effects on groundwater would be confined to the local water tables within the sub-watersheds crossed by the Project. Therefore, the geographic scope for cumulative impact on groundwater would be the HUC-12 sub-watershed.[52] Further, most Project effects on groundwater would occur during construction; therefore, the temporal extent for cumulative impacts on groundwater resources would be temporary. Other actions in the Project vicinity also could impact groundwater, but for cumulative impacts to occur, the location and timing of those other effects must overlap the Project effects.

Thirty-one other actions could occur within the geographic scope and temporal extent for groundwater cumulative impacts (see table 4.12.3-2).[53] Each of these actions would likely involve ground disturbance that could affect shallow groundwater resources. The other actions could also require groundwater appropriation or discharge, and may occur in proximity to water supply wells and within SWPAs.

The overall geographic scope for cumulative groundwater impacts encompasses 10 sub-watersheds totaling about 223,965 acres (see figure 4.12.1-1). Cumulatively, the Project and other actions would impact about 1,176.4 acres (0.5 percent) of the total sub-watershed area. We conclude that there would be no significant cumulative impacts on groundwater resources because of the small aggregate size of actions within the sub-watersheds and because each action would likely be required to obtain permits, such as storm and waste water discharge permits, that are designed to reduce impacts on groundwater and other resources. Further, as discussed in section 4.3.1.8, the majority of Project construction would occur above the shallow water table, thereby avoiding most direct impacts on groundwater resources. Transco would also implement measures in its Plan, Procedures, Onshore HDD Contingency Plan, Spill Plan, Unanticipated Discovery of Contamination Plan, and other measures to further avoid or minimize impacts on groundwater resources, including water supply wells, in proximity to construction.

Offshore

The Project would not impact potable, offshore groundwater resources, therefore, there would be no cumulative impacts.

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[52] The United States is divided and sub-divided into successively smaller hydrologic units that represents land areas where precipitation and stream flow drain to a common outlet. The drainage unit used for our analysis in this EIS is referred to as a HUC-12, or sub-watershed. It is important to note that not all precipitation drains out of a sub-watershed; some water infiltrates into the ground where it recharges aquifers.

[53] Dredging associated with New York Harbor Maintenance Dredging (CD-1) would occur in the lower reaches of the Raritan River and in the Arthur Kill, which, for the purpose of this analysis, are considered part of the onshore environment.

TABLE 4.12.3-2

Other Actions Within the Geographic Scope and Temporal Extent for Onshore Groundwater Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Approximate Size of Other Action within the Geographic Scope (acres)
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.2	63.6
South Lime Street Bridge (TR-1)	0.7 mile NW	0.1
Peters Creek Road Bridge Restoration (TR-2)	4.9 miles SE	1.9
Poultry Barn Construction (CI-1)	1.0 mile SE	2.2
COMPRESSOR STATION 200		
Power Supply to Compressor Station 200 (NJ-1)	Extends 0.9 mile from CS 200	11.4
New York Bay Expansion Project (EN-3)	At CS 200	20.9
Pennsylvania Pipeline/Mariner East II Project (EN-4)	0.8 mile SW	43.9
Swedesford Townhomes (RS-1)	<0.1 mile SE	16.0
Townes at Malvern (RS-2)	0.8 mile SE	10.0
Glen Loch II Subdivision (RS-3)	1.2 miles S	56.0
Marquis at Exton (RS-4)	2.8 miles SW	22.1
Atwater Crossing (RS-5)	3.1 miles E	33.6
Parkview at Oaklands (RS-6)	3.4 miles SW	36.6
Great Valley Community Organization Recreational Facility (CI-2)	0.2 mile SE	7.6
Whiteland Village Mixed Use Development (CI-3)	0.8 mile E	74.8
Exton Square Mall Parking Lot Expansion (CI-4)	2 miles SW	9.9
Atwater Lot 13 Commercial Development (CI-5)	2.8 miles E	34.9
Great Valley Corporate Center (CI-6)	2.9 miles E	81.4
Atwater Commercial Development (CI-7)	3.2 miles NE	10.9
COMPRESSOR STATION 206		
Wilson Farm Senior Housing (RS-7)	1.3 miles NE	9.8
MADISON & RARITAN BAY LOOPS		
New York Bay Expansion Project (EN-3)	Madison Loop MP 10.0 – 10.5; Morgan M&R Station	39.4
Middlesex Energy Center (EN-5)	2.1 miles W	8.7
Poseidon Electric Transmission Line (EN-6)	1.2 miles N	49.6
U.S. Highway 9, Bordentown Avenue, Kenneth Avenue Improvements (TR-3)	0.8 mile NW	3.7
South Amboy Intermodal Transportation Center (TR-4)	1.1 miles NW	40.1
New Jersey Route 18 Drainage and Pavement Rehabilitation (TR-8)	3.4 miles W	3.1
La Mer Residential Development (RS-9)	MP 11.0	21.5
Windermere Townhome Development (RS-10)	MP 11.3	13.7
Alfieri Residential Development (RS-11)	1.5 miles S	93.9
Garden Grove on Nine Residential Development (RS-12)	2.5 miles S	15.7
New York Harbor Maintenance Dredging (CD-1)	1.2 miles N	23.7

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
TR = Transportation Project
RS = Residential Project
CI = Commercial/Industrial Project
CD = Channel Dredging Project

4.12.3.4 Surface Waters, Fish, and Aquatic Resources

Onshore

Project construction could have direct and indirect impacts on onshore surface water quality and flow, as well as on fish and other organisms that inhabit affected waters. These impacts could include increased sedimentation, turbidity, decreased dissolved oxygen, impaired flow, releases of chemicals and nutrient pollutants, reduced riparian cover, thermal changes, modification of habitat, and fish injury or mortality. Project construction in New Jersey could also impact surface water intakes for public water supplies, although the potential is remote. Most impacts from Project construction on waterbodies and aquatic resources would be temporary, with conditions returning to normal shortly after in-stream construction and restoration is completed. Impacts on riparian areas affected by construction would be short-term, with those areas expected to recover within 1 to 3 years. Thus, the temporal extent for cumulative impacts on onshore surface waters would range from temporary to short-term. Operation of the NESE Project would not significantly impact surface waters, fish, or other aquatic resources in the onshore environment. Most effects of Project construction on surface waters and aquatic resources would occur within the immediate area of the waterbody crossing, and would diminish with distance downstream of the crossing. However, for our analysis, we conservatively consider the geographic scope for cumulative impacts on surface waters, fish, and other aquatic resources to be the HUC-12 sub-watersheds crossed by the Project. Other actions within the HUC-12 watersheds that involve similar activities could also impact surface waters and aquatic resources. Thus, cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. Eleven other actions that could impact onshore surface waters occur within the geographic scope and temporal extent for cumulative impacts (see table 4.12.3-3).

TABLE 4.12.3-3

Other Actions Within the Geographic Scope and Temporal Extent for Cumulative Impacts on Surface Waters, Fish, and Aquatic Resources

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Number of Waterbodies at Each Site within the Geographic Scope
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.3	4
South Lime Street Bridge (TR-1)	0.7 mile NW	1
Peters Creek Road Bridge Restoration (TR-2)	4.9 miles SE	1
COMPRESSOR STATION 206		
Wilson Farm Senior Housing (RS-7)	1.3 miles NE	1
MADISON & RARITAN BAY LOOPS		
New York Bay Expansion Project (EN-3)	Madison Loop MP 10.0 – 10.5	6
Poseidon Electric Transmission Line (onshore segments) (EN-6)	1.2 miles N	1
South Amboy Intermodal Transportation Center (TR-4)	1.1 miles NW	1
Windermere Townhome Development (RS-10)	MP 11.3	2
Alfieri Residential Development (RS-11)	1.5 miles S	1
Garden Grove on Nine Residential Development (RS-12)	2.5 miles S	2
New York Harbor Maintenance Dredging (CD-1)	1.2 miles N	1

[a] Key to Action ID:
EN = Energy Project
TR = Transportation Project
RS = Residential Project
CI = Commercial/Industrial Project
CD = Channel Dredging Project

Each action listed in table 4.12.3-3 could have similar adverse effects on waterbodies and aquatic resources as the NESE Project. The extent to which each of these actions would actually impact surface waters and aquatic resources is unknown; however, we anticipate that proponents of the other projects would strive to avoid working in or near waterbodies; implement erosion control and other practices to minimize impacts on surface water resources; and obtain and comply with applicable permits that are designed to minimize impacts on water resources. We also note that, although the other actions could impact an estimated 21 waterbodies within the geographic scope of the NESE Project, most of the other actions are more than 1 mile from the NESE Project, which would reduce the potential for direct, cumulative impacts. The two nearest actions, the Atlantic Sunrise Pipeline Project and the New York Bay Expansion Project, are both interstate natural gas transmission projects under FERC jurisdiction. Construction of the New York Bay Expansion Project was completed in late 2017 with final stormwater management activities and restoration inspections completed in 2018. The Atlantic Sunrise Pipeline Project was placed in service in October 2018 and restoration is underway. These two nearest projects have been and will be completed in accordance with construction and restoration methods designed to minimize impacts on surface water and aquatic resources, and most, if not all, of the construction-related impacts will have ceased prior to construction of the NESE Project. As detailed in sections 2.3.2.1 and 4.3.2.7, Transco would similarly be required to construct, restore, and maintain the NESE Project in accordance with measures included in its Plans, Procedures, other plans, and our recommendations. These measures include, among other things, special waterbody construction methods; limiting workspace and construction time in and near waterbodies; implementing construction timing restrictions that would protect sensitive resources; and filing the results of Transco's consultations with public water supply operators, which we anticipate would indicate no significant potential to impact public surface water intakes. For these reasons, we conclude that construction and operation of the NESE Project and other projects in the area would not result in significant cumulative impacts on surface water resources, fish, and other aquatic resources in the onshore environment.

Offshore

The Raritan Bay Loop would be installed entirely below the seafloor at depths largely determined by USACE marine traffic safety requirements, and Transco has designed the Raritan Bay Loop such that future excavation of the facilities would not be necessary under normal operating conditions. As a result, operation of the Raritan Bay Loop would not result in any significant impacts once installed and, therefore, we do not evaluate cumulative impacts of Project operation on offshore water quality, fish, or other aquatic resources.

Construction of the Raritan Bay Loop could adversely impact water quality and aquatic organisms including submerged aquatic vegetation, plankton, benthic communities, fisheries (fish, mollusks, crustaceans, and species of special concern), marine mammals, and sea turtles. The majority of impacts would be associated with pile driving noise and increased turbidity and sedimentation from subsea trenching, excavation, backfilling, and dredge disposal. Other construction related activities could also impact aquatic resources, including the withdrawal and discharge of hydrostatic test water, resuspension of contaminated sediments, vessel movement, the inadvertent release of HDD drilling fluid, and accidental spills of hazardous materials.

Regarding water quality and sedimentation, hydrodynamic modeling determined that the maximum time for discrete, Project-related turbidity to return to ambient conditions would be about 7.9 hours. As discussed in section 4.5.2.8, Project effects on most marine organisms, including those due to the resuspension of contaminated sediments, would be temporary, primarily because water quality would return to ambient conditions shortly after construction. Benthic communities would take slightly longer to recover, but would be expected to recolonize within 1 to 3 years. Thus, the temporal extent for cumulative impacts on offshore waters and marine resources due to increased turbidity and sedimentation would range from temporary to short-term.

Hydrodynamic modeling also determined that a sediment plume greater than 50 mg/l above ambient conditions would extend from 0 to about 5,299 feet from various construction activities, with longer plumes generally occurring in association with discrete excavations. Modeling also determined that sediment deposition of at least 0.12 inch (0.3 centimeter) would extend a maximum of about 958 feet from Project seafloor disturbances and encompass an irregular area of about 947.4 acres (see figures 4.5.2-2 and 4.5.2-3). For our cumulative impacts analysis, we assumed that other seafloor disturbing actions would result in similar turbidity and sedimentation as the Raritan Bay Loop. Thus, we utilized an area that encompasses an additional 1,250 feet beyond the 0.12-inch (0.3 centimeter) sedimentation contour as the geographic scope for cumulative impacts on offshore waters and aquatic resources.

The temporal extent for potential cumulative impacts on aquatic resources due to marine vessel traffic and construction noise would also be limited to the period of construction and, thus, temporary. We considered the general area of New York Harbor, including Raritan and Lower New York Bay, as the geographic scope for potential cumulative impact for marine vessel traffic. As discussed in section 4.5.2.8, in-air noise associated with offshore construction would not be expected to impact aquatic resources. The greatest underwater noise generating activity would involve driving 163 temporary piles, 34 of which would be installed via a combination of diesel impact hammer and vibratory device. Hydroacoustic modeling indicates that vibratory pile driving could result in sound levels capable of causing marine mammal behavior disturbance at up to 13.4 miles from the source for the largest piles, representing the greatest (most conservative) geographic scope for cumulative construction noise impacts on aquatic resources. However, given the amount of existing vessel traffic noise in the Project area, as well as noise monitoring reports from other recent underwater pile driving activities, we expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances.

Two other actions, the Poseidon Electric Transmission Line and New York Harbor Maintenance Dredging, occur within the geographic scope and temporal extent for cumulative impacts on offshore water quality and aquatic resources (see table 4.12.1-3 and figure 4.12.1-1). Both projects would involve marine vessel traffic and result in seafloor disturbance, turbidity, and sedimentation; in addition, as discussed in section 2.3.3.10, Transco would utilize dredge material for supplemental backfill of the Raritan Bay Loop that is obtained as part of the ongoing New York Harbor Maintenance Dredging action. Cumulatively, the Project and other actions would involve about 40.2 linear miles of seafloor construction within the geographic scope. About 23.3 miles (58 percent) would be attributable to the Project and 16.9 miles (42 percent) would be attributable to other actions. It is important to note that construction activities at any given location and any given time would be limited to small, discrete areas where dredging, cable lay, and/or pipeline installation happen to be occurring at any given time. The overall disturbance at each location would last only a few days or weeks as the activity moves through the area. Marine mammals, fish, and mobile benthic organisms disturbed by construction would likely relocate to adjacent suitable habitat and return to the area once the activities are completed. Sessile benthic organisms in the excavation areas would be destroyed and the sediments that fall out of suspension could bury adjacent individuals. As discussed in section 4.5.2.8, benthic communities disturbed by dredging or smothering would be expected to recolonize through natural succession within 1 to 3 years. Faster rates of recovery would occur in areas less affected by sedimentation. For these reasons, significant cumulative impacts on marine mammals, fish, and benthic organisms from seafloor disturbance, sedimentation, and/or turbidity would not be expected.

The Project and other actions could resuspend and redistribute contaminated seafloor sediments. Contaminants that become resuspended during sediment-disturbing construction activities are expected to generally be adsorbed to organic material and fine-grained sediment, and redeposited as sediment-bound compounds. Contaminant concentrations would also be diluted by the transport of sediments away from the source. To predict the transport and fate of contaminants that may be resuspended by Project construction, Transco conducted contaminant transport modeling for analytes that exceeded Class C thresholds and high Class B concentrations in sediment samples. Based on the modeling results, the maximum concentrations would generally meet water quality standards and be expected to be below chronic toxicity levels at the edge of a 500-foot mixing zone. For some of the modeled scenarios, water quality standards for mercury and copper would not be met at the edge of the mixing zone, based on conservative rates of continuous dredging. In these areas, Transco would use slower dredging rates as necessary, based on field monitoring, to help ensure compliance with the water quality standards for copper and for mercury at sites with Class C concentrations of mercury. Thus, the release of sediment-bound contaminants could result in minor cumulative impacts on water quality and aquatic organisms along the proposed pipeline route and other linear actions in the area, but these effects would be minor and temporary and would subside upon completion of construction activities.

No submerged aquatic vegetation beds were identified within the offshore workspace of the Project; therefore, cumulative impacts on submerged aquatic vegetation would not be expected.

Larger offshore marine species, particularly marine mammals and sea turtles, could be vulnerable to vessel strikes during construction of the Project and other actions in the area. Most strikes are caused by small, fast moving vessels, whereas most vessels used to construct the Project would be larger, slower moving craft. Although the Project would result in increased vessel traffic, the effect would be small and localized relative to the existing traffic in and out of New York Harbor. Given the greater scale and complexity of construction of the Raritan Bay Loop, the level of vessel traffic associated with the Poseidon Electric Transmission Line and New York Harbor Maintenance Dredging Project would likely be less, and also small and localized compared to existing vessel traffic in the area. In addition, Transco would comply with applicable speed restrictions, marine mammal approach/distance restrictions, and observer/lookout protocols as detailed in its Marine Mammal Observer Training and Response Protocol Plan. Execution of the Poseidon Electric Transmission Line and New York Harbor Maintenance Dredging Project would also be permitted facilities and thus, we expect that proponents of those actions would also implement measures to minimize the potential for striking marine mammals and other aquatic resources during vessel transits. Therefore, significant cumulative impacts on large marine organisms from vessel strikes would not be expected.

Underwater noise generated by the Project and other actions also could disrupt marine species, although probably not within the same geographic scope as sediments. As discussed in section 4.5.2.8, pile driving noise levels capable of causing behavioral disturbance could extend up to 13.4 miles from the noise source for marine mammals, 6.2 miles for fish, and 0.5 mile for sea turtles. We expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances. Existing underwater noise is dominated by large vessels and container ships. Although noise would be generated by the Project and other actions, these activities are not uncommon in the bay. The New York-New Jersey bay is a highly-developed port with considerable vessel traffic, human activity, and noise. The existing background noise in the underwater environment is dominated by large vessels and container ships and is similar to the noise that would be generated by the largest vessels that would be used during construction of the pipeline. As such, the movement of the relatively small number of vessels associated with the Project would not be expected to substantially affect the existing underwater noise environment or aquatic resources. Most marine mammals, fish, and other mobile organisms are accustomed to traffic, noise, and activity, and those affected by minor noise disturbances likely would relocate to adjacent suitable habitat and return to the affected area once the activities are completed. Though the duration of construction activities would be limited and most fish species would be able to leave the area of disturbance, harassment or injury of individual fish due to pile driving noise is possible. Pile driving noise impacts on fish are expected to be temporary and moderate and population-level impacts due to construction noise are not expected. Marine mammals in the Project area could also experience harassment from pile driving noise, but by constructing the Raritan Bay Loop in accordance with measures that may be included in the NMFS IHA, Transco's plans, and our recommendations, construction noise is not expected to have a significant impact on marine mammals in the Project area. Therefore, significant cumulative noise impacts in the offshore environment would not be expected as a result of the Project.

4.12.3.5 Wetlands

Onshore

Project activities such as clearing, grading, trenching, and backfilling could result in minor impacts on wetland functions and values. Other actions in the Project vicinity also could impact wetlands, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. One method of evaluating impacts on wetlands is to compare the magnitude of wetland impacts to the total amount of wetlands within the sub-watersheds (HUC-12) crossed by the Project. Using this approach, the geographic scope for cumulative impacts on wetlands would be the entire wetland community within the sub-watersheds crossed by the Project. As discussed in section 4.3.4, Project effects on wetlands would range from temporary to permanent, depending on the type of wetland impacted. Impacts on PEM wetlands would be temporary because they would return to original emergent function and value shortly after construction. Impacts on PSS wetlands would be generally short term, taking about 3 years to return to original scrub-shrub function and value. Impacts on PFO wetlands would range from long term in temporary workspaces where it could take many years for tree communities to return to preconstruction condition, to permanent where trees would not be allowed to become reestablished directly over the pipeline. Therefore, the temporal extent of cumulative impacts on wetlands would range from temporary to permanent.

Twelve other actions could occur within the geographic scope and temporal extent for wetland cumulative impacts (see table 4.12.3-4 and figure 4.12.1-1). Each of these actions would involve some work in or immediately adjacent to wetlands and could potentially impact wetland functions and values. No other actions are in or near mapped wetlands within the sub-watershed and, thus, would not contribute to cumulative wetland impacts.

The geographic scope is comprised of the 14,549.3-acre wetland community within 10 sub-watersheds crossed by the Project. Table 4.12.3-5 summarizes the type and acreage of wetlands within each sub-watershed and the amount of wetland that would be impacted by the Project and other actions.

TABLE 4.12.3-4 **Other Actions Within the Geographic Scope and Temporal Extent for Onshore Wetland Cumulative Impacts**		
NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Approximate Area of Wetlands at Each Site within the Geographic Scope (acres)
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.3	1.1
COMPRESSOR STATION 200		
Marquis at Exton (RS-4)	2.8 miles SW	2.2
Parkview at Oaklands (RS-6)	3.4 miles SW	14.2
Whiteland Village Mixed Use Development (CI-3)	0.8 mile E	2.7
Exton Square Mall Parking Lot Expansion (CI-4)	2.0 miles SW	3.3
Great Valley Corporate Center (CI-6)	2.9 miles E	5.9
MADISON & RARITAN BAY LOOPS		
Middlesex Energy Center (EN-5)	2.1 miles W	0.4
South Amboy Intermodal Transportation Center (TR-4)	1.1 miles NW	<0.1
La Mer Residential Development (RS-9)	MP 11.0	<0.1
Windermere Townhome Development (RS-10)	MP 11.3	<0.1
Alfieri Residential Development (RS-11)	1.5 miles S	7.4
Garden Grove on Nine Residential Development (RS-12)	2.5 miles S	11.0

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
TR = Transportation Project
RS = Residential Project
CI = Commercial/Industrial Project

Cumulatively, the Project and other actions would impact about 61.3 acres (0.4 percent) of wetlands within the geographic scope. This includes disturbing about 23.1 acres of emergent wetlands (0.6 percent of the total emergent wetlands in the sub-watershed); about 2.1 acres of scrub-shrub wetlands (0.3 percent of the total scrub-shrub wetlands in the sub-watershed); and about 36.1 acres of forested wetlands (0.3 percent of the total forested wetlands in the sub-watershed). The overall magnitude of wetland impacts relative to the total amount of wetlands within the sub-watershed is small; therefore, we conclude that there would be no significant cumulative impacts on wetlands. Further, the actual extent to which each action would impact wetlands is uncertain and this analysis likely overestimates wetland impacts by assuming all on-site wetlands would be impacted. However, many other actions would likely avoid or minimize impacting wetlands to conform to regulatory requirements. Wetlands are broadly regulated under the CWA and avoidance, minimization, compensation, and/or replacement would be required for most impacts. As detailed in section 4.3.4.3, Transco would implement project-specific measures to avoid, minimize, and mitigate impacts on wetlands, further reducing cumulative wetland impacts in the area. Therefore, we conclude that construction of the NESE Project and other projects in the area would not result in significant cumulative impacts on wetlands.

TABLE 4.12.3-5 **Cumulative Wetland Impacts**				
Wetland Type	Size of Wetlands Present within the Geographic Scope (acres)	Approximate Size of Project Wetland Impacts within the Geographic Scope (acres)	Approximate Size of Other Action Wetland Impacts within the Geographic Scope (acres)	Approximate Size of Project Plus Other Action Wetland Impacts within the Geographic Scope (acres)
QUARRYVILLE LOOP				
Emergent Wetland (PEM)	496.7	2.5	-	2.5
Scrub-Shrub Wetland (PSS)	52.9	<0.1	-	<0.1
Forested Wetland (PFO)	990.9	<0.1	1.1	1.2
Subtotal	1,540.5	2.5	1.1	3.8
MADISON & RARITAN BAY LOOPS				
Emergent Wetland (PEM or E2EM)	2,779.9	5.4	2.9	8.3
Scrub-Shrub Wetland (PSS or E2SS)	284.5	0.3	-	0.3
Forested Wetland (PFO)	4,419.7	0.4	15.9	16.3
Subtotal	7,484.1	6.1	18.8	24.9
COMPRESSOR STATION 200				
Emergent Wetland (PEM)	81.6	-	11.4	11.4
Scrub-Shrub Wetland (PSS)	19.1	-	1.5	1.5
Forested Wetland (PFO)	348.0	-	15.4	15.4
Subtotal	448.7	-	28.3	28.3
COMPRESSOR STATION 206				
Emergent Wetland (PEM)	283.7	0.9	-	0.9
Scrub-Shrub Wetland (PSS)	301.3	0.3	-	0.3
Forested Wetland (PFO)	4,491.0	2.6	0.7	3.3
Subtotal	5,076.0	3.8	0.7	4.5
TOTAL				
Emergent Wetland (PEM or E2EM)	3,641.9	8.7	14.3	23.1
Scrub-Shrub Wetland (PSS or E2SS)	657.8	0.6	1.5	2.1
Forested Wetland (PFO)	10,249.6	3.0	33.1	36.1
TOTAL	14,549.3	12.5	48.9	61.3

Offshore

The Project would not impact offshore wetlands; therefore, there would be no offshore cumulative impacts on this resource.

4.12.3.6 Vegetation and Wildlife

Onshore

Project activities such as clearing, grading, and installation of impervious surfaces (e.g., compression station pads, access roads) could result in impacts on vegetation and wildlife. Other actions in the Project vicinity also could impact vegetation and wildlife, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. As with wetlands discussed above, Project effects on vegetation and wildlife can be objectively evaluated by comparing the magnitude of anticipated impacts to the total amount of vegetation and wildlife habitat within the sub-watersheds (HUC-12) crossed by the Project. As such, the geographic scope for cumulative impacts on vegetation and wildlife would be the vegetation communities and wildlife habitat within the sub-watersheds crossed by the Project. Also, as with wetlands, Project effects on vegetation and wildlife would depend on the type of vegetation and wildlife habitat affected and the rate at which the vegetation and wildlife habitat would regenerate after construction. Impacts on vegetation and wildlife within agricultural lands would be temporary to short term because they would return to their preconstruction condition within 1 year of construction. Impacts on herbaceous vegetation and open wildlife habitat would be temporary to short term because these areas likely would revegetate within 1 to 3 years of construction. Impacts on shrubby vegetation and scrub-shrub habitat would be short to long term because it would take 3 to 5 years to regain composition. Impacts on forested vegetation and habitat would be long term or permanent because trees would take up to 50 years or longer to become reestablished and would not be allowed to become reestablished directly over the pipeline. Therefore, the temporal extent of cumulative impacts on vegetation and wildlife would extend from the start of construction and continue for some period thereafter based on the vegetation and habitat type affected.

Twenty-five other actions could occur within the geographic scope and temporal extent for vegetation and wildlife cumulative impacts (see table 4.12.3-6 and figure 4.12.1-1). Most of these actions would involve some clearing and grading of vegetation and, therefore, would result in loss of habitat, mortality of less mobile wildlife species, displacement of more mobile wildlife species, alteration of wildlife habitat (including fragmentation), and potentially introduce non-native species.

The geographic scope is comprised of two major vegetation/habitat types totaling 165,412.1 acres within 10 sub-watersheds crossed by the Project. These vegetation/habitat types include open upland and forest land. Wetlands are not included in this analysis because they are discussed separately in section 4.12.3.5 above. Open uplands include agricultural and residential uses because those uses typically have vegetation cover and provide some wildlife habitat. Table 4.12.3-7 summarizes the type and acreage of vegetation/habitat within each sub-watershed and the amount of vegetation/habitat that would be impacted by the Project and other actions.

TABLE 4.12.3-6

Other Actions Within the Geographic Scope and Temporal Extent for Onshore Vegetation and Wildlife Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Approximate Amount of Vegetation/Habitat Cover at Each Site within the Geographic Scope (acres) [b]
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.3	48.4
Peters Creek Road Bridge Restoration (TR-2)	4.9 miles SE	0.1
Poultry Barn Construction (CI-1)	1.0 mile SE	2.2
COMPRESSOR STATION 200		
Power Supply to Compressor Station 200 (NJ-1)	At CS 200	9.1
Pennsylvania Pipeline/Mariner East II Project (EN-3)	0.8 mile SW	36.6
Swedesford Townhomes (RS-1)	<0.1 mile SE	15.9
Townes at Malvern (RS-2)	0.8 mile SE	10.0
Glen Loch II Subdivision (RS-3)	1.2 miles S	46.8
Marquis at Exton (RS-4)	2.8 miles SW	16.2
Atwater Crossing (RS-5)	3.1 miles E	30.1
Parkview at Oaklands (RS-6)	3.4 miles SW	19.8
Great Valley Community Organization Recreational Facility (CI-2)	0.2 mile SE	7.2
Whiteland Village Mixed Use Development (CI-3)	0.8 mile E	64.2
Exton Square Mall Parking Lot Expansion (CI-4)	2.0 miles SW	5.3
Atwater Lot 13 Commercial Development (CI-5)	2.8 miles E	25.2
Great Valley Corporate Center (CI-6)	2.9 miles E	70.8
Atwater Commercial Development (CI-7)	3.2 miles NE	7.1
COMPRESSOR STATION 206		
Wilson Farm Senior Housing (RS-7)	1.3 miles NE	8.8
MADISON & RARITAN BAY LOOPS		
Middlesex Energy Center (EN-5)	2.1 miles W	8.2
U.S. Highway 9, Bordentown Avenue, Kenneth Avenue Improvements (TR-3)	0.8 mile NW	0.3
South Amboy Intermodal Transportation Center (TR-4)	1.1 miles NW	20.3
La Mer Residential Development (RS-9)	MP 11.0	21.1
Windermere Townhome Development (RS-10)	MP 11.3	12.9
Alfieri Residential Development (RS-11)	1.5 miles S	75.3
Garden Grove on Nine Residential Development (RS-12)	2.5 miles S	2.5

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
TR = Transportation Project
RS = Residential Project
CI = Commercial/Industrial Project

[b] Does not include wetlands, which are discussed in section 4.2.3.5 above.

TABLE 4.12.3-7

Cumulative Vegetation and Wildlife Habitat Impacts

Vegetation/Habitat Community Type [a]	Size of Vegetation/Habitat Vegetation and Wildlife Habitat within the Geographic Scope (acres)	Approximate Size of Project Impacts on Vegetation and Wildlife Habitat within the Geographic Scope (acres)	Approximate Size of Other Action Impacts on Vegetation and Wildlife Habitat within the Geographic Scope (acres)	Approximate Size of Project Plus Other Action Impacts on Vegetation and Wildlife Habitat within the Geographic Scope (acres)
QUARRYVILLE LOOP				
Open Upland	75,777.8	195.9	50.7	246.6
Forest Land	31,054.8	6.2	12.1	18.3
Subtotal	106,832.6	202.1	62.8	264.9
MADISON & RARITAN BAY LOOPS				
Open Upland	11,824.0	28.7	110.3	139.0
Forest Land	3,790.7	12.2	30.3	42.5
Subtotal	15,614.7	40.9	140.6	181.5
COMPRESSOR STATION 200				
Open Upland	14,284.0	6.0	248.7	254.7
Forest Land	7,275.1	0.1	115.6	115.7
Subtotal	21,559.1	6.1	364.3	370.4
COMPRESSOR STATION 206				
Open Upland	14,492.1	6.6	3.8	10.4
Forested Upland	6,913.6	16.6	8.0	24.6
Subtotal	21,405.7	23.2	11.8	35.0
TOTAL				
Open Upland	116,377.9	237.2	413.5	650.7
Forested Upland	49,034.2	35.1	166.0	201.1
TOTAL	165,412.1	272.3	579.5	851.8

[a] This table does not include wetlands, which are discussed in section 4.12.3.5 above. The “Open Upland” category in this table includes agricultural and residential land.

Cumulatively, the Project and other actions would impact about 851.8 acres of vegetation/habitat within the geographic scope (or 0.5 percent of the total vegetation community in the sub-watershed). This includes disturbing about 650.7 acres of open upland (or 0.6 percent of the total open upland in the sub-watershed) and 201.1 acres of forest land (or 0.4 percent of the total forest land in the sub-watershed). Vegetation and habitat would be permanently removed as part of the Project and other actions where new buildings, structures, and impervious surfaces are installed. However, the amount of land that would be permanently converted for the other actions is not known because specific design details of each action are not known. Regardless, vegetation cover and wildlife habitat are abundant within the geographic scope and the overall magnitude of impacts relative to the total amount of vegetation and habitat within the sub-watershed is small. For this reason, we conclude that there would not be significant cumulative impacts on vegetation or wildlife.

We received comments concerning the impact of tree removal associated with the NESE Project within the broader context of tree loss due to human (e.g., logging, development) and natural causes (e.g., storms, wildfires) in the northeast region. As we discuss in section 4.12.2, 90 to 95 percent of Pennsylvania was forested when Europeans first settled in the region, but by the late 1800s, forest cover had been reduced to 36 percent by logging and wildfires. New Jersey and New York were not as heavily forested originally, but forest cover was also decimated by the late 1800s. Through subsequent conservation efforts, about 60 percent of Pennsylvania is forested today, and forest cover in New Jersey and New York have similarly recovered. As indicated in table 4.4.1-3, construction of the NESE Project would result in the loss of 35.0 acres of upland forest, of which 16.1 acres would be permanently lost through construction of aboveground facilities or on-going vegetation maintenance in pipeline rights-of-way. The remaining 18.9 acres affected by construction would be allowed to revert to pre-construction conditions, but this would be a long-term process. Although the scope of our review for potential cumulative impacts on upland forest was the HUC-12 watersheds in which the NESE Project occurs, to put the cumulative impact data in table 4.12.3-7 in a more regional context, the National Land Cover Database indicates that 395,635 acres of forest covers the four counties in which tree removal would occur in conjunction with the NESE Project. Thus, construction and operation of the NESE Project and other projects considered in our analysis would have a negligible cumulative impact on forest resources in the region.

Offshore

Cumulative impacts on offshore vegetation and wildlife are discussed in section 4.12.3.4.

4.12.3.7 Special Status Species

The ESA requires the FERC to consult with the FWS and the NMFS to ensure that the Project will not jeopardize the existence of any federally listed threatened or endangered species or critical habitat. The ESA prohibits the take of any threatened and endangered species except under federal permit or incidental take permit. A federal permit or take statement is issued only if impacts on a listed species are not significant. Similar rules apply at the state level in New York, New Jersey, and Pennsylvania for state-listed species. Thus, given the regulatory requirements around special status species, the Project would not have a cumulatively significant impact on special status species.

Additionally, marine mammals are federally protected under the MMPA. While many marine mammals are listed as threatened or endangered under the ESA, the MMPA provides additional protections for all marine mammals. The MMPA prohibits, with certain exceptions, the take of marine mammals. Where incidental take by harassment cannot be avoided, the NMFS has the authority to issue IHAs, so long as the effects are not significant on the species. Thus, given the regulatory requirements, the Project would not have a cumulatively significant impact on marine mammals.

4.12.3.8 Land Use, Recreation, and Visual Resources

Onshore

Project activities such as clearing, grading, and construction of buildings, structures and/or impervious surfaces (e.g., compression station pads, access roads) could result in impacts on land use. Other actions in the Project vicinity also could impact land use, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. One method of evaluating impacts on land use is to compare the magnitude of impacts on different land uses to the total amount of land available within the sub-watersheds (HUC-12) crossed by the Project. Using this approach, the geographic scope for cumulative impacts on land use would be all the various land uses[54] within the sub-watersheds crossed by the Project. The duration of impacts on land use would depend on the type of land cover affected and the rate at which the land can be restored to its preconstruction use and condition after construction. For example, Project impacts on agricultural land, transportation land, residential land, commercial/ industrial land, and open water would be temporary because they would return to their preconstruction uses and conditions almost immediately after construction. Impacts on open lands, emergent wetlands, and scrub-shrub wetlands would be short to long term because those areas likely would require 1 to 5 years to regain preconstruction use and composition. Impacts on forested uplands and wetlands would be long term or permanent because trees would take up to 50 years or longer to become reestablished and would not be allowed to become reestablished directly over the pipeline. Impacts where new buildings, structures, and/or impervious surfaces are installed also would be permanent because they would permanently change the underlying land use. In summary, the temporal extent of cumulative impacts on land use would extend from the start of construction and continue for a specific period of time based on type of land use affected and whether new buildings, structures, or impervious surfaces are constructed on the land.

Thirty-one other actions could occur within the geographic scope and temporal extent for land use cumulative impacts (see table 4.12.1-3 and figure 4.12.1-1). Each of these actions likely would involve ground disturbance and could affect land use.

The geographic scope is comprised of 8 major land use categories within 10 sub-watersheds crossed by the Project. These land use categories include agricultural land, forest land, commercial/industrial, transportation land, residential, open land, wetland, and open water. Table 4.12.3-8 summarizes the type and acreage of land use within each sub-watershed and the amount of land that would be impacted by the Project and other actions.

Cumulatively, the Project and other actions would impact about 1,163.0 acres of land within the geographic scope (or 0.5 percent of the total land in the geographic scope). This includes disturbing about 320.1 acres of agricultural land (or 0.4 percent of the total agricultural land in the geographic scope); 200.9 acres of forest land (or 0.4 percent of the total forest land in the geographic scope); 79.8 acres of commercial/industrial (or 3.7 percent of the total commercial/industrial in the geographic scope); 79.7 acres of transportation land (or 0.4 percent of the total transportation land in the geographic scope); 100.9 acres of residential (or 0.7 percent of the total residential in the geographic scope); 231.4 acres of open land (or 0.9 percent of the total open land in the geographic scope); 61.4 acres of wetland (or 0.4 percent of the total wetland in the geographic scope); and 88.8 acres of open water (or 0.4 percent of the total open water in the geographic scope). A sizable portion of land associated with the residential, commercial/industrial, and transportation projects listed in table 4.12.3-8 would permanently convert existing land uses to residential, commercial/industrial, and transportation land uses where new buildings, structures, and impervious surfaces are installed. However, the amount of land that would be permanently converted to a new land use within each project site is not known because specific design details of each action are not known. Regardless, each of the various land uses exists in various proportions within the geographic scope, and the overall magnitude of change relative to the amount of existing land is small. Thus, we conclude that there would be no significant cumulative impacts on land use.

54 Land use types are similar to vegetation cover types except that land use cover also includes developed property (e.g., residential, commercial/industrial, and transportation [road/railroad] property) and open water (e.g., rivers, ponds, lakes, and offshore waters).

TABLE 4.12.3-8

Cumulative Land Use Impacts

Vegetation/Habitat Community Type	Size of Land Use Type Present within the Geographic Scope (acres)	Approximate Size of Project Impacts on Land Use within the Geographic Scope (acres)	Approximate Size of Other Action Impacts on Land Use within the Geographic Scope (acres)	Size of Project Plus Other Action Impacts on Land Use within the Geographic Scope (acres)
QUARRYVILLE LOOP				
Agricultural Land	67,555.8	178.6	47.3	225.9
Forest Land	31,054.8	6.2	12.1	18.3
Commercial/Industrial	105.6	3.1	-	3.1
Transportation Land	7,085.8	5	3.8	8.8
Residential	1,132.2	4.4	-	4.4
Open Land	7,089.8	12.8	3.4	16.2
Wetland	1,540.5	2.5	1.1	3.6
Open Water	8,913.2	0.3	0.1	0.4
Subtotal	124,477.7	212.9	67.8	280.7
MADISON & RARITAN BAY LOOPS				
Agricultural Land	592.7	-	8.2	8.2
Forest Land	3,790.7	12.1	30.3	42.4
Commercial/Industrial	1,008.1	29.5	20.1	49.6
Transportation Land	5,853.1	11.2	11.5	22.7
Residential	6,434.9	2.7	36.5	39.2
Open Land	4,796.4	27.8	65.6	93.4
Wetland	7,484.1	6.1	18.8	24.9
Open Water	9,768.4	0.5	82.7	83.2
Subtotal	39,728.4	89.9	273.7	363.6
COMPRESSOR STATION 200				
Agricultural Land	2,563.5	-	84.7	84.7
Forest Land	7,275.1	<0.1	115.6	115.6
Commercial/Industrial	733.9	22.3	4.8	27.1
Transportation Land	4,945.2	0.6	46.8	47.4
Residential	4,098.2	-	56.9	56.9
Open Land	7,622.3	6.0	107.1	113.1
Wetland	448.7	-	28.3	28.3
Open Water	344.3	-	4.9	4.9
Subtotal	28,031.2	28.9	449.1	478.0
COMPRESSOR STATION 206				
Agricultural Land	3,505.3	0.7	0.6	1.3
Forest Land	6,913.6	16.6	8.0	24.6
Commercial/Industrial	290.8	-	-	-
Transportation Land	3,992.2	-	0.8	0.8
Residential	3,501.6	-	0.4	0.4
Open Land	7,485.2	5.9	2.8	8.7
Wetland	5,076.0	3.9	0.7	4.6
Open Water	963.2	-	0.3	0.3
Subtotal	31,727.9	27.1	13.6	40.7

TABLE 4.12.3-8 (cont'd) **Cumulative Land Use Impacts**				
Vegetation/Habitat Community Type	Size of Land Use Type Present within the Geographic Scope (acres)	Approximate Size of Project Impacts on Land Use within the Geographic Scope (acres)	Approximate Size of Other Action Impacts on Land Use within the Geographic Scope (acres)	Size of Project Plus Other Action Impacts on Land Use within the Geographic Scope (acres)
TOTAL				
Agricultural Land	74,217.3	179.3	140.8	320.1
Forest Land	49,034.2	34.9	166.0	200.9
Commercial/Industrial	2,138.4	54.9	24.9	79.8
Transportation Land	21,876.3	16.8	62.9	79.7
Residential	15,166.9	7.1	93.8	100.9
Open Land	26,993.7	52.5	178.9	231.4
Wetland	14,549.3	12.5	48.9	61.4
Open Water	19,989.1	0.8	88.0	88.8
TOTAL	223,965.2	358.8	804.2	1,163.0

Project activities also could result in impacts on recreational and special interest areas. As identified in table 4.7.5-1, the Project would cross Muddy Run Recreational Park, Muddy Run State Game Lands 423, Silver Top Stables, and Fishing Creek Nature Preserve North. As discussed in section 4.7.5.1, impacts on recreation and special interest areas as a result of the Project are expected to be temporary, minor, and resolved with the completion of construction. No other actions listed in table 4.12.1-3 would cross these same recreational and special interest areas; however, the Atlantic Sunrise Pipeline Project (EN-1) crosses the Enola Low Grade Trail, which is about 0.2 mile northwest of the NESE Project, and the Windermere Townhome Redevelopment (RS-10) is about 50 feet south of the NESE Project. These other actions would be conducted in coordination with the owners/managers of the areas, and thus also would be expected to be temporary, minor, and resolved with the completion of construction. As such, we do not expect that the Project would, when combined with other actions, result in significant cumulative impacts on recreation or special interest areas.

Project activities also could result in impacts on the visual character of the surrounding landscape. The geographic scope for visual impacts would be different than the geographic scope for land use impacts, although the temporal extent would be the same. The geographic scope for visual impacts is made up of the established viewpoints (e.g., existing nearby roads, trails, homes, and businesses) from which Project impacts would be visible.

The greatest visual impact of the Project, combined with the other projects in the geographic scope, would be primarily from the conversion of forest land to open or developed land uses. Also of consideration for long-term visual impacts would be the cleared permanent operational pipeline easement viewed from recreational or special interest areas where the area may be managed for its scenic features. Users of these features may be more sensitive to the impacts associated with the projects given its designation and management. Limiting the permanent right-of-way to 50 feet; expanding and collocating existing rights-of-way (versus creating new greenfield areas); and adhering to the restoration and right-of-way maintenance measures outlined in Transco's Plan and Procedures would also reduce the impacts associated with the Project. Aboveground facilities such as compressor stations would have additional visual impacts on the surrounding landscape. Whereas these permanent visual impacts may be locally noticed, generally they would not be inconsistent with the existing visual character of the area. With regard to compressor stations, the installations at Compressor Station 200 would be constructed within an existing commercial/industrial site and there would be no change to the visual character of the station. The construction of Compressor

Station 206 would occur within the forest interior and there are no established viewpoints outside the station boundaries from which it would be visible to the public at visually sensitive areas. Because Compressor Stations 200 and 206 would not result in a significant impact on visual resources, no significant cumulative visual impacts would be associated with the compressor station facilities as a result of other projects in the area.

Offshore

Cumulative impacts on offshore uses (i.e., commercial fishing and shellfishing) and recreation (i.e., recreational fishing, whale watching, and scuba and snorkeling) are discussed in section 4.12.3.9 below. The Project would have little impact on offshore aesthetics. The only offshore activities that would be visible to the public would be construction vessel traffic in the bay. However, the bay is part of one of the most active commercial and industrial ports in the world. Thus, the modest boat traffic associated with the Project and the two other potentially cumulative actions in the vicinity would not be conspicuous, and significant cumulative visual impacts would not be expected.

4.12.3.9 Socioeconomics

Onshore

Construction and operation of the Project could result in changes to population and employment; increased demand for housing and public services; transportation and tourism impacts; and an increase in government revenue associated with sales, payroll, and property taxes. Other actions in the Project vicinity could also impact the regional socioeconomic setting, and cumulative impacts could occur where the location and timing of those other effects overlap the Project effects. As discussed in section 4.8.1, socioeconomic effects of the Project can be effectively evaluated by analyzing the counties traversed by the Project. As such, the geographic scope for cumulative impacts on socioeconomics would be the counties traversed by the Project. Also, as discussed in section 4.8.1, Project effects on socioeconomics would depend on the specific resource impacted. Impacts on population and employment; demand for housing and public services; transportation and tourism; and government revenue from sales and payroll taxes would be temporary because these impacts would be limited to the period of construction. Impacts on government revenue associated with property taxes would be long term to permanent because Transco would pay ad valorem property tax on its pipeline indefinitely. Therefore, the temporal extent of cumulative impacts on socioeconomic resources would extend from the start of construction for an indefinite period and would be based on the specific resource affected.

Thirty-nine other actions could occur within the geographic scope and temporal extent for socioeconomic cumulative impacts (see table 4.12.3-9 and figure 4.12.1-1).

Construction of the Project would result in a temporary minor increase in employment during construction, including both local and non-local hires. Construction of other actions also would increase employment, but details on the number and timing of local and non-local hires are not available. Although population may temporarily increase with non-local hires, such an increase is not anticipated to be substantial relative to the existing population. Additionally, the unemployment rate may decrease, but this too would be temporary and would be a benefit where unemployment is presently greater than about 6 percent (see table 4.8.2-2). According to Transco, operation of the Project would result in two new permanent hires to operate and maintain Compressor Station 206. Regardless of whether the hires are local or non-local, the addition of two permanent jobs would be individually and cumulatively insignificant on socioeconomics and related resources.

TABLE 4.12.3-9

Other Actions Within the Geographic Scope and Temporal Extent for Onshore Socioeconomic Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Counties in Common with the Project
QUARRYVILLE LOOP		
Atlantic Sunrise Pipeline Project (EN-1)	MP 1683.3	Lancaster, PA
Eastern Shore 2017 Expansion Project (EN-2)	10.8 miles E	Chester & Lancaster, PA
South Lime Street Bridge (TR-1)	0.7 mile NW	Lancaster, PA
Peters Creek Road Bridge Restoration (TR-2)	4.9 miles SE	Lancaster, PA
Poultry Barn Construction (CI-1)	1.0 mile SE	Lancaster, PA
COMPRESSOR STATION 200		
Power Supply to Compressor Station 200 (NJ-1)	At CS 200	Chester, PA
Pennsylvania Pipeline/Mariner East II Project (EN-3)	0.8 mile SW	Chester & Lancaster, PA
Swedesford Townhomes (RS-1)	<0.1 mile SE	Chester, PA
Townes at Malvern (RS-2)	0.8 mile SE	Chester, PA
Glen Loch II Subdivision (RS-3)	1.2 miles S	Chester, PA
Marquis at Exton (RS-4)	2.8 miles SW	Chester, PA
Atwater Crossing (RS-5)	3.1 miles E	Chester, PA
Parkview at Oaklands (RS-6)	3.4 miles SW	Chester, PA
Great Valley Community Organization Recreational Facility (CI-2)	0.2 mile SE	Chester, PA
Whiteland Village Mixed Use Development (CI-3)	0.8 mile E	Chester, PA
Exton Square Mall Parking Lot Expansion (CI-4)	2.0 miles SW	Chester, PA
Atwater Lot 13 Commercial Development (CI-5)	2.8 miles E	Chester, PA
Great Valley Corporate Center (CI-6)	2.9 miles E	Chester, PA
Atwater Commercial Development (CI-7)	3.2 miles NE	Chester, PA
COMPRESSOR STATION 206		
Wilson Farm Senior Housing (RS-7)	1.3 miles NE	Somerset, NJ
East Meadow Estates (RS-8)	3.1 miles NE	Somerset, NJ
Veronica Crossings (CI-8)	7.1 miles NE	Somerset, NJ
Hamilton Commons (CI-9)	8.8 miles NE	Somerset, NJ
Engel Burman at Somerset Mixed-Use Development (CI-10)	10 miles N	Middlesex & Somerset, NJ
MADISON & RARITAN BAY LOOPS		
Middlesex Energy Center (EN-5)	2.1 miles W	Middlesex, NJ
Poseidon Electric Transmission Line (EN-6)	1.2 miles N	Middlesex, NJ
U.S. Highway 9, Bordentown Avenue, Kenneth Avenue Improvements (TR-3)	0.8 mile NW	Middlesex, NJ
South Amboy Intermodal Transportation Center (TR-4)	1.1 miles NW	Middlesex, NJ
Raritan River Drawbridge Replacement (TR-5)	1.7 miles NW	Middlesex, NJ
Garden State Parkway Interchange 125 Reconstruction (TR-6)	2.2 miles NW	Middlesex, NJ
U.S. Highway 9, New Jersey Route 35, and Main Street Interchange Reconstruction (TR-7)	2.2 miles NW	Middlesex, NJ
New Jersey Route 18 Drainage and Pavement Rehabilitation (TR-8)	3.4 miles W	Middlesex, NJ
La Mer Residential Development (RS-9)	MP 11.0	Middlesex, NJ
Windermere Townhome Development (RS-10)	MP 11.3	Middlesex, NJ
Alfieri Residential Development (RS-11)	1.5 miles S	Middlesex, NJ
Garden Grove on Nine Residential Development (RS-12)	2.5 miles S	Middlesex, NJ
The Point at Sayreville Retail and Residential (CI-11)	2.4 miles NW	Middlesex, NJ
Recon Services Mixed-use Development (CI-12)	8.5 miles NW	Middlesex, NJ
New York Harbor Maintenance Dredging (CD-1)	1.2 miles N	Middlesex, NJ

TABLE 4.12.3-9 (cont'd) Other Actions Within the Geographic Scope and Temporal Extent for Onshore Socioeconomic Cumulative Impacts		
NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Counties in Common with the Project

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
TR = Transportation Project
RS = Residential Project
CI = Commercial/Industrial Project
CD = Channel Dredging Project

Temporary housing would be required for non-local construction workers. The number of non-local construction workers that would be required for cumulative actions is unknown; however, we anticipate that the great majority of construction workers for other potentially cumulative projects would be locally sourced based on the types of projects involved (i.e., residential, commercial, and road construction), which do not typically require specialized labor, as would the NESE Project. Notwithstanding, given the current vacancy rates, the number of rental housing units in the area, and the number of hotel/motel rooms available (see table 4.8.3-1), non-local construction workers should not encounter difficulty in finding temporary housing. If construction of the Project is concurrent with other actions, proprietors of the local motels, hotels, and other rental units could benefit through increased revenue; however, it could increase competition (and cost) for short-term housing and could decrease housing availability for tourists, recreationalists, and local renters or residents. While some construction activity would be conducted during the peak tourism season, sufficient temporary housing is still likely to be available for tourists. Temporary housing, however, may be more difficult to find (particularly on short notice) and/or more expensive to secure during the peak tourism season.

Additional public services (e.g., police, fire, and emergency medical services) would also be required to accommodate non-local construction workers hired on the Project. Based on the total number of police, fire stations, and hospitals, there appears to be adequate public service infrastructure to accommodate the Project. If construction of the Project occurs concurrently with other actions in the region, the area could experience an incremental increase in the need for public services in the event of a shared emergency. It is unclear whether demand for these services would exceed existing capabilities; however, it seems unlikely because the non-local workers that would create the need for additional public services likely would represent only a very small fraction of the populations (see table 4.8.2-1 for population levels and trends within the geographic scope).

Construction of the Project could affect transportation due to increased vehicle traffic associated with commuting of the construction workforce as well as movement of heavy trucks and delivery of equipment and materials. If construction occurs concurrently with other actions in the region, the area could experience increased traffic and congestion on the local road and highway system. Twenty-eight of the 39 other actions (72 percent) are more than 1 mile from the Project; as such traffic conflicts would be unlikely. Further, Project impacts on traffic would be temporary and other actions likely would not have similar commuting schedules or reach peak traffic conditions simultaneous with the Project. Thus, significant cumulative impacts on transportation are not expected.

Although the Project could affect recreation, and consequently tourism, by constructing across or through parks, preserves, trails, golf courses and recreational areas, these impacts would be temporary. As discussed in section 4.7.5.1, Transco would develop site-specific crossing plans in consultation with applicable managing agencies and organizations to minimize impacts at certain tourist and recreational sites. As such, impacts on recreation areas as a result of the Project are expected to be temporary, minor, and resolved with the completion of construction. This, combined with the fact that construction and operation of the other actions in the geographic scope also would be conducted in coordination with the landowners and land-managing agencies, suggests there would be no significant cumulative impacts on tourism.

Construction and operation of the Project would have beneficial impacts on government revenues, both on a temporary basis from payroll and sales taxes collected during construction, and on a permanent basis from property taxes collected during operation of the pipeline. Other actions would have similar beneficial impacts on government revenues because payroll and sales tax would be collected during construction of those projects, and most other projects, except transportation projects, would be subject to property tax. Some projects, such as transportation projects, would use public funds for their construction; however, overall cumulative impacts on government revenues from the Project and other actions are expected to be beneficial.

Offshore

Offshore activities could also result in cumulative impacts on socioeconomics. The geographic scope for cumulative impacts on socioeconomics would be New York and New Jersey state waters and the shoreline within Raritan Bay affected by the Project. The temporal extent of cumulative impacts on socioeconomics would be the Project duration and shortly thereafter. Also, as with onshore activities, the temporal extent of cumulative impacts on socioeconomic resources would extend from the start of construction for an indefinite period and would be based on the specific resource affected.

Nine other actions could occur within the geographic scope and temporal extent for socioeconomic cumulative impacts (see table 4.12.3-10 and figure 4.12.1-1).

TABLE 4.12.3-10

Other Actions Within the Geographic Scope and Temporal Extent for Offshore Socioeconomic Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Counties in Common with the Project
RARITAN BAY LOOP		
Poseidon Electric Transmission Line (EN-6)	MPs 13.9 & 35.2	Middlesex & Monmouth, NJ and Queens, NY
Raritan and Sandy Hook Bay-Port Monmouth Hurricane and Storm Damage Reduction (BR-1)	4.3 miles S	Monmouth, NJ
South Shore of Staten Island Coastal Storm Risk Management Project (BR-2)	3.7 miles N	Richmond, NY
Living Breakwaters Project (BR-3)	1.3 miles N	Richmond, NY
New York Harbor Maintenance Dredging (CD-1)	MPs 17.6, 25.0 & 30.0	Middlesex & Monmouth, NJ and Richmond & Queens, NY
Great Kills Harbor Dredging (CD-2)	0.3 mile N	Richmond, NY
Jamaica Bay at Rockaway Inlet Dredging (CD-3)	2.2 miles N	Queens, NY
Sandy Hook Bay at Leonardo Dredging (CD-4)	5.0 miles SW	Monmouth, NJ
East Rockaway Inlet Maintenance (CD-5)	6.3 miles NE	Queens, NY

[a] Key to Action ID:
EN = Energy Project
BR = Beach and Shoreline Management Project
CD = Channel Dredging Project

Construction and operation of offshore components of the Project would result in similar impacts as the onshore components for population and employment; increased demand for housing and public services; transportation and tourism impacts; and an increase in government revenue associated with sales, payroll, and property taxes. However, commercial and recreational fishing and shellfishing; whale watching; and scuba and snorkeling also could be impacted by construction.

Commercial and recreational fishing and shellfishing is common throughout the bay, and the bay in general has been important fishing grounds since the settlement of North America. The region continues to produce commercial quantities of fish and shellfish, as well as support a considerable amount of saltwater sport fishing activity (see sections 4.7.5.2 and 4.8.5.2). Transco's proposed pipeline would cross five recreational fishing grounds, known as "sport ocean fishing grounds:" Tin Can, Scallop Ridge, Between the Channels, Gong Grounds, and Ambrose Channel Grounds. These areas are in New Jersey and New York state waters between the Sandy Hook and the Rockaway Peninsula and are designated as "prime fishing areas" by New Jersey. Other actions could also affect these fishing grounds, as well as others in the bay, including End Between Channel Grounds, False Hook Channel Grounds, Rockaway Grounds, and Sandy Hook Channel Grounds. However, the cumulative impacts would not likely be significant because construction activities for any of the actions at any given location and at any given time would be limited to small, distinct areas where dredging, cable lay, and/or pipeline installation happen to be occurring. Construction activities would be temporary, transitory, and localized in nature, and ample space within the affected fishing grounds and other nearby fishing grounds could be used instead.

Whale watching is also common in the bay. Commercial whale watching areas are divided into two main categories: general use areas and dominant use areas. General use areas are defined as the full footprint of whale-watching, regardless of the frequency or intensity of whale-watching activity, while dominant use areas are defined as areas within the general use area that are routinely used for whale-watching activity. Cumulatively, the Project and other actions would impact both general and dominant use areas within the bay. However, as with fishing, the cumulative impacts would not likely be significant because construction activities would be temporary, transitory, and localized in nature and because whales likely would avoid the work areas and inhabit other areas in the bay where whale watching could occur.

Scuba and snorkeling also occurs throughout much of the bay. Cumulatively, the Project and other actions would impact scuba and snorkeling within the bay by prohibiting such activities in areas of active construction; however, as with fishing and whale watching, the cumulative impacts would not likely be significant because construction activities would be temporary, transitory, and localized in nature and because ample other opportunities for scuba and snorkeling are present throughout the bay.

4.12.3.10 Cultural Resources

The Project would not impact eligible or potentially eligible cultural resources either onshore or offshore; therefore, there would be no cumulative impacts on cultural resources associated with the Project. Transco would implement its UDPs to address situations where possible cultural resources are unexpectedly encountered during construction.

4.12.3.11 Air Quality

Onshore construction would involve the use of heavy, earthmoving equipment, onroad/offroad vehicles, generators, air compressors, and other equipment that would generate air emissions largely through combustion of diesel fuel or gasoline. Onshore construction would also generate particulate matter in the form of fugitive dust. Offshore construction would involve emissions from marine vessels (e.g., tugboats and barges), as well as from compressors, pumps, generators, and other equipment, including HDD drill rigs. Both onshore and offshore construction emissions would cease with the end of construction; thus, the temporal extent for cumulative air quality impacts during construction of the NESE Project would be temporary and contemporaneous with construction. Construction emissions would also disperse within the airshed and diminish in concentration with distance from active construction areas. Therefore, the geographic scope for cumulative air quality impacts includes other actions within a 0.25-mile from onshore and offshore Project construction work areas.

The additional compression proposed at Compressor Station 200 would be powered by electricity and would not substantially increase emissions at the station. Therefore, there would be no appreciable operational cumulative impacts on air quality associated with the modifications at Compressor Station 200.

Compressor Station 206 would be a minor, indefinite source of air emissions; therefore, impacts on air quality would be ongoing and permanent in the near vicinity of the station. Current sources of air emissions are accounted for in background monitored values presented in table 4.10.1-2. We first looked at all reasonably foreseeable, minor sources within 10 miles of Compressor Station 206 and found several residential, commercial, and mixed-use developments. However, these appear to be redevelopment of previously used sites, or infilling within largely developed commercial and residential areas, and we did not identify operating air permitting requirements for these new commercial/residential developments in New Jersey. Therefore, the use of these developments, once completed, would not be expected to substantially alter existing air quality in the region. We then looked for reasonably foreseeable, major sources of air emissions out to 50 kilometers (31 miles), as this is the maximum distance used in air quality modeling for PSD-applicable sources; we only identified the Sewaren Generating Station (EN-7), a modified 540-MW combined-cycle natural gas plan 23 miles northeast of Compressor Station 206 in Middlesex County, New Jersey, as a new PSD source. The power station was slated to begin operation in 2018.

Based on the 0.25-mile, contemporaneous criteria, seven other actions occur within the geographic scope and temporal extent for construction-related air quality cumulative impacts (see table 4.12.3-11 and figure 4.12.1-1).

Onshore Construction

Onshore construction would temporarily increase air quality impacts surrounding the NESE Project construction workspaces. Construction of the actions listed in table 4.12.3-11 would also temporarily generate fugitive dust from ground disturbance and tailpipe emissions from standard passenger vehicles and construction equipment, and could contribute to cumulative impacts on air quality if constructed at the same time as the NESE Project. Construction emissions from the Project and other actions would dissipate with distance from the various construction activities and local air quality would return to ambient conditions soon after construction ceases. Proponents of other actions would be required to implement measures to minimize construction emissions per Pennsylvania and New Jersey regulations.

TABLE 4.12.3-11

Other Actions Within the Geographic Scope and Temporal Extent for Construction-Related Air Quality and Noise Cumulative Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project	Potential Area of Disturbance
COMPRESSOR STATION 200		
Power Supply to Compressor Station 200 (NJ-1)	At CS 200	11 acres
Swedesford Townhomes (RS-1)	<0.1 mile SE	16 acres
Great Valley Community Organization Recreational Facility (CI-2)	0.2 mile SE	8 acres
MADISON LOOP		
La Mer Residential Development (RS-9)	MP 11.0	22 acres
Windermere Townhome Development (RS-10)	MP 11.3	14 acres
RARITAN BAY LOOP (OFFSHORE)		
Poseidon Electric Transmission Line (EN-6)	MPs 13.9 & 35.2	78 acres
New York Harbor Maintenance Dredging (CD-1)	MPs 17.6, 25.0 & 30.0	31 miles

[a] Key to Action ID:
NJ = Non-jurisdictional Facility
EN = Energy Project
RS = Residential Project
CI = Commercial/Industrial Project
CD = Channel Dredging Project

The Swedesford Townhomes and Great Valley Community Organization Recreational Facility are anticipated to be constructed in the vicinity of Compressor Station 200 with presently unknown construction schedules. The power supply to the station is anticipated to be constructed concurrently with the new compressor unit. Should these projects overlap for some or all of their respective construction schedules, nearby residents could be subjected to construction emissions and dust from multiple projects for weeks at a time.

As discussed in section 4.10.1, Project construction activities in the NJ-NY-CT Interstate AQCR would be offset by NO_x mitigation projects and/or the purchase of ECRs or CREs as required by federal General Conformity, yielding long-term benefits to air quality by reducing regional NO_x emissions.

Offshore Construction

Construction of the Project and other actions would also generate air emissions in the offshore environment through the use of similar marine-based equipment, and could contribute to cumulative air quality impacts if constructed within the geographic scope and temporal extent of the NESE Project.

Similar to onshore construction within the NJ-NY-CT Interstate AQCR, Transco would mitigate offshore construction impacts of the Raritan Bay Loop through implementation of NO_x and VOC (and thereby ozone) mitigation offset projects and/or the purchase of ECRs or CREs, which would reduce overall cumulative air quality impacts (see section 4.10.1.4). Emissions of other criteria pollutants during construction would be below General Conformity thresholds and are deemed to have conformed.

Onshore Operation

Emissions from operation of Compressor Station 206 and the Sewaren Generating Station (EN-7) in Middlesex County, New Jersey could potentially result in cumulative impacts. The Sewaren Generating Station is a modification of an existing facility where older emissions units have been (or will be) retired. The Sewaren Generating Station would be required to comply with all applicable federal air quality permitting programs, including the NAAQS and any associated monitoring/reporting requirements, and must conform to the New Jersey SIP. The emissions associated with Compressor Station 206 and the Sewaren Generating Station would be long term, lasting for the life of each facility; however, the Sewaren Generating Station is downwind of Compressor Station 206, far exceeding a distance where the compressor station's emissions would attenuate to well below background. As a result, we do not anticipate any operation-related cumulative air quality impacts.

4.12.3.12 Noise

Construction of the NESE Project would require the use of heavy equipment, HDD drilling rigs, marine vessels, pile driving equipment, and other equipment and vehicles, all of which would generate in-air noise (underwater noise and its effects on marine aquatic resources are discussed in section 4.12.3.4). Other actions in the Project area would also generate noise, and cumulative impacts could occur where the location and timing of those noise effects overlap the Project noise effects. As discussed in section 4.10.2.2, Project construction noise would attenuate quickly as the distance from the construction site increases. Therefore, the geographic scope for cumulative effects of noise during onshore and offshore construction is an area about 0.25 mile around the Project construction workspace and 0.5 mile around HDD sites.

Operational noise would be generated by Compressor Stations 200 and 206. Compressor Station noise would also attenuate with distance from the stations, and would be required to comply with our noise criteria at NSAs. The geographic scope for cumulative effects of operational noise includes a 1.0-mile radius from each station site. Compressor stations would operate indefinitely into the future; therefore, the temporal extent of cumulative operational noise impacts is permanent.

Seven other actions could occur within the geographic scope and temporal extent for construction-related noise cumulative impacts (see table 4.12.3-11, above, and figure 4.12.1-1). Five other actions could occur with the geographic scope and temporal extent for operational cumulative noise impacts, all in the vicinity of Compressor Station 200 (see table 4.12.3-12).

TABLE 4.12.3-12

Other Actions Within the Geographic Scope and Temporal Extent for Operational Cumulative Noise Impacts

NESE Project Facility/Action Name (Action ID) [a]	Approximate Location Relative to the NESE Project
COMPRESSOR STATION 200	
New York Bay Expansion Project (EN-3)	At CS 200
Swedesford Townhomes (RS-1)	<0.1 mile SE
Townes at Malvern (RS-2)	0.8 mile SE
Great Valley Community Organization Recreational Facility (CI-2)	0.2 mile SE
Whiteland Village Mixed Use Development (CI-3)	0.8 mile E

[a] Key to Action ID:
EN = Energy Project
RS = Residential Project
CI = Commercial/Industrial Project

Onshore Construction

Three actions that could contribute to cumulative noise impacts occur within 0.25 mile of Compressor Station 200. Because of the unknown timing of many of these projects, we assume that construction would occur during operation of Compressor Station 200. As described in table 4.12.1-3, the power supply for the proposed electric-driven compressor units at Compressor Station 200 would involve upgrading 0.9 mile of existing overhead electric transmission line to the compressor station, but construction of the utility service at and near Compressor Station 200 could contribute to construction noise at the station. Construction noise associated with the Project and other actions would be temporary and would dissipate quickly with distance from the noise generating activity. Construction of the station, and presumably other projects in the area, would also occur during daytime hours (7:00 a.m. to 7:00 p.m.) in conformance with local noise ordinances, further limiting potential cumulative impacts on surrounding NSAs. However, we described above under air quality onshore construction, an overlap in construction schedules could result in several weeks or months of concurrent construction projects for nearby residents.

Construction of the two residential projects along the Madison Loop and the Lockwood HDD entry and exit sites could coincide with Project construction, resulting in cumulative noise impacts on nearby NSAs. As indicated above, construction noise for the Project and other actions would be temporary and would dissipate quickly with distance from the noise generating activity. With the exception of HDD activities, which may be conducted around the clock until completion, construction of the Madison Loop, and presumably other projects in the area, would occur during daytime hours (7:00 a.m. to 7:00 p.m.), further limiting potential cumulative impacts on surrounding NSAs. Transco has committed to implement noise mitigation at HDD sites to maintain the FERC's 55 dBA L_{dn} standard at the nearest NSAs. Due to the temporary, localized, and daytime nature of most construction activities, the transitory nature of pipeline construction, and the fact that Transco would implement mitigation measures at HDD sites, we conclude that cumulative, onshore construction noise impacts would not be significant.

Offshore Construction

Cumulative impacts of in-air noise associated with the construction of the Raritan Bay Loop (which includes the offshore Raritan Bay Loop HDD sites), Poseidon Electric Transmission Line, and New York Harbor Maintenance Dredging Project, are unlikely given that the construction of each project where they intersect in the open water of Raritan and New York Bay would have to occur at the same time and considering there are no NSAs within at least 1 mile of the estimated crossing locations of the projects. Specific to the offshore Raritan Bay Loop HDD sites, the nearest actions range from about 2.0 miles (Living Breakwaters Project) to 3.0 miles (Jamaica Bay at Rockaway Inlet Dredging) away, outside of the cumulative impacts geographic scope. Potential impacts on marine mammals from underwater noise and vibrations are discussed in section 4.12.3.6.

Onshore Operation

The projects that could contribute to ambient noise during operation of Compressor Station 200 include residential/commercial development projects. The operation of the New York Bay Expansion Project would contribute to noise; however, its impacts were reviewed as part of the existing environment in section 4.10.2.2 (see table 4.10.2-4). At this time, there are no known projects anticipated to be constructed within a 1-mile radius of Compressor Station 206 during station operation. As discussed in section 4.10.2.2, we conclude that operation of Compressor Stations 200 and 206 are not expected to result in a perceptible noise increase at the nearest NSAs.

We received comments that existing noise levels in the vicinity of Compressor Station 206 already are high because of heavy traffic on Route 27, activity at a nearby shooting range, and blasting and truck traffic associated with Trap Rock quarry. Our noise analysis in section 4.10.2.2 considers existing noise levels at NSAs near Compressor Station 206, including from the types of noise generating activity identified by commenters.

We conclude that construction and operation of Compressor Stations 200 and 206 would not contribute significantly to existing noise in the area.

4.12.3.13 Reliability and Safety

Impacts on reliability and public safety would be mitigated by the DOT Minimum Federal Safety Standards in 49 CFR 192, which are intended to protect the public and to prevent natural gas facility accidents and failures. In addition, Transco's construction contractors would be required to comply with OSHA's Safety and Health Regulations for Construction in 29 CFR 1926. Based on safety requirements outlined in 49 CFR 192, such as establishment of an Emergency Response and Integrity Management Plans and pipeline monitoring, we conclude that, while there would be a slight increase in risk associated with the NESE Project and those within the geographic scope, the cumulative safety impacts would not be significant.

We received numerous comments expressing concern that blasting at the Trap Rock quarry could have a cumulative damaging effect on Compressor Station 206 and Transco's existing Mainline system over time. As discussed in detail in section 4.11.4, we conclude that blasting activities would not pose a safety concern to Compressor Station 206 and Transco's Mainline system, but have recommended that Transco file the final foundation designs incorporating additional safety factors to address the potential for future increases of blasting intensity at the Trap Rock quarry.

4.12.4 Climate Change

We received several comments expressing concern about the Project's contribution to global climate change. The GHG emissions from the construction and operation of the Project are presented in section 4.11.1.4. A description of impacts from climate change is presented in this section.

Climate change is the change in climate over time and cannot be represented by single annual events or individual anomalies. For example, a single large flood or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change. However, recent research has begun to attribute certain extreme weather events to climate change (U.S. Global Change Research Program, 2018).

Climate change has resulted in a wide range of impacts across every region of the country and those impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health. The United States and the world are warming; global sea level is rising and acidifying; and certain weather events are becoming more frequent and more severe. These changes are driven by accumulation of GHG in the atmosphere through combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests. These impacts have accelerated throughout the end 20th and into the 21st century. Although climate change is a global concern, for this analysis, we focus on the potential cumulative impacts in the NESE Project areas.

The following observations of environmental impacts are attributed to climate change in the Northeast region with a high or very high level of confidence (U.S. Global Change Research Program, 2017 and 2018):

- annual average temperatures from 1901 to 2016 in New England increased about 3 °F;
- temperatures are projected to increase by 4.2 to 8.5 °F by the 2090s under the worst-case scenario (continually increasing emissions), and would increase by 1.7 °F to 4.4 °F if emissions were decreased;

- the number of days above 90 °F are projected to increase, resulting in major human health implications;
- from 1958 to 2010 the Northeast experienced a 70 percent increase in the amount of precipitation falling in heavy events (the greatest increase in the nation) and 5 to 20 percent increase in average winter precipitation;
- the global sea level has risen by about 8 inches since reliable record keeping began in 1880, and is projected to rise another 1 to 4 feet by 2100;
- higher than average sea level rise along the Northeastern coast will occur due to land subsidence;
- severe flooding due to sea level rise and heavy downpours are likely to occur more frequently;
- increased fall and winter precipitation could damage crops, and wetter springs would result in delayed planting of grain and vegetables;
- an increase in carrier habitat and human exposure to vector-borne diseases (e.g., Lyme disease, Zika, Chikamunya, or West Nile); and
- coastal water temperature in several regions are likely to continue warming as much as 4 to 8 °F by 2100.

In addition to the regional impacts listed above, New York City has estimated local climate projections using a baseline from years 1971 to 2000, extending to 2100. Some of these impacts include the following by 2020 and the 2050s:

- The average temperature would increase from 54 °F up to 57 °F in 2020 and 61 °F in the 2050s;
- Coastal flooding would increase by up to 1.5 percent by 2020 and 3.6 percent by the 2050, with 100-year flood heights reaching 13.8 feet by the 2050s;
- The number of days per year with rainfall exceeding 2 inches would increase from 3 to up to 5 days by 2020, and up to 4 days by the 2050s.
- Precipitation would increase by up to 10 percent in 2020 and up to 13 percent by the 2050s;
- Sea level rise would increase by as much as 10 inches in 2020 and 30 inches by the 2050s;

We received comments regarding the impact of sea-level rise (commonly associated with climate change) would have on the Project. The onshore facilities consist of buried pipelines and aboveground facilities such as compressor stations, valves, and meter stations. These facilities would be designed to meet or exceed DOT standards under 49 CFR 192, which requires operators to design their pipeline facilities to protect against hazards such as floods, landslides, and hurricanes.

The NESE Project would be constructed in Pennsylvania, New Jersey, and New York. Energy and sustainability goals for these states are discussed below.

- The Pennsylvania State Energy Program achieves environmental improvement by directing time and resources toward expanding the use of renewable energy, reducing overall energy usage, and promoting conversion to less polluting fuels. The State of Pennsylvania anticipates that these measures will reduce air pollution, support economic growth in the renewable technology sector, and enhance quality of life (Pennsylvania, 2017). The State Energy Program supports projects that help achieve the previously stated goals.

- The State of New Jersey issued its Energy Master Plan in 2011, which outlines its goals to reduce its carbon footprint; increase the state's reliance on renewable and "clean" energy sources, including hydroelectric generation, natural gas, and nuclear energy; and reach 70 percent of state electricity generation through renewable and clean energy sources by 2050 (New Jersey, 2011). The Energy Master Plan also calls for the safe expansion of the natural gas pipeline system in New Jersey for electricity generation and to lower wholesale power costs while lessening the state's dependence on oil.

- The City of New York issued its PlaNYC: A Greener, Greater New York sustainability plan in 2011. The plan is a multi-pronged approach to sustainability and includes energy goals such as reducing New York City government's energy consumption, strengthening building codes, supporting the expansion of natural gas infrastructure, fostering the market for renewable energy, and accelerating reliability improvements to New York City's electric grid (NYC, 2011). In addition, the State of New York's 2015 New York State Energy Plan outlines measures to increase the state's use of renewable energy, increase energy efficiency of homes and buildings, and modernize the existing energy infrastructure. The plan also establishes the following targets to be met by 2030: 1) achieve a 40 percent reduction in GHGs from 1990 levels; 2) obtain 50 percent of electricity generation from renewable sources; and 3) achieve a 600 trillion British thermal unit increase in statewide energy efficiency (NYS, 2015).

The Project would align with the state and local goals outlined above primarily by improving air quality and offsetting the use of more carbon-intensive fossil fuels by supporting the continued conversion of building heating systems from fuel oil to natural gas in New York City. Burning natural gas produces about 80 percent less particulate matter and lower emissions of other contaminants than burning no. 4 fuel oil (NYCDEP, 2012). As of 2012, New Yorkers continued to burn more than 1 billion gallons of heating oil annually, contributing to approximately 14 percent of all fine particulate matter emitted in New York City (NYCDEP, 2012). The use of no. 6 fuel oil as a primary heating fuel was largely phased out by 2015, and the use of no. 4 fuel oil is still scheduled to be largely phased out by 2030.

Construction and operation emissions from the NESE Project would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to future climate change impacts. However, there is no widely accepted standard, per international, federal, or state policy, or as a matter of physical science, to determine the significance of the Project's GHG emissions.

4.12.5 Conclusion

Most cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. Temporary cumulative impacts could result from the release of sediment-bound contaminants during offshore construction activities. In addition, residents near Compressor Station 200 and along the Madison Loop could experience temporary cumulative impacts from construction emissions, dust, and noise if project construction schedules overlap. Short-term cumulative benefits could also be realized through increased government revenues from the Project and other actions. Finally, emissions from construction and operation of the Project would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to future climate change impacts; however, we cannot determine whether the NESE Project's contribution would be significant. Therefore, with the possible exception of climate change, we conclude that cumulative impacts would be insignificant.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS OF THE ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of the FERC environmental staff. Our conclusions and recommendations were developed with input from the EPA, USACE, and the City of New York. The federal cooperating agencies may adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, they conclude that their permitting requirements and/or regulatory responsibilities have been satisfied. However, these agencies would present their own conclusions and recommendations in their respective and applicable records of decision. Otherwise, they may elect to conduct their own supplemental environmental analysis, if necessary.

We determined that construction and operation of the NESE Project would result in some adverse environmental impacts, most of which would occur during construction (e.g., impacts on residences and offshore impacts related to turbidity, sedimentation, and pile driving noise). Long-term impacts on air quality and noise would result from the operation of Compressor Station 206. As part of our review, we developed specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the Project. We are therefore recommending that our mitigation measures be attached as conditions to any authorizations issued by the Commission. With implementation of Transco's impact avoidance, minimization, and mitigation measures, as well as their adherence to our recommendations, we conclude that all Project effects would be reduced to less-than-significant levels.

A summary of the anticipated impacts, our conclusions, and our recommended mitigation measures is provided below, by resource area.

5.1.1 GEOLOGY

Construction and operation of the Project would not materially alter existing geologic conditions in the area and the overall effect of the Project on topography would be minor.

The potential for a significant, damaging earthquake to affect the Project area is low and the Project would not cross any surface faults that exhibit evidence of activity within the last 1.6 million years. The pipelines would be constructed using arc-welding techniques and would be resistant to traveling groundwave effects and moderate amounts of permanent deformation. Aboveground facilities would also be designed, constructed, and operated in accordance with modern engineering standards and applicable DOT construction and safety requirements. The Project area also has a low susceptibility and incidence of landslide activity, and pipeline installation techniques, including padding and use of rock-free backfill, effectively insulate the pipe from minor earth movements.

The eastern 0.4 mile of the Quarryville Loop and existing Compressor Station 200 are underlain by carbonate bedrock and karst features have been documented in these areas. The primary impact that could affect the Project facilities is the sudden development of a sinkhole that damages the facilities and creates a public safety risk. In addition, flooding within closed depressions and other karst features could pose a buoyancy concern to the limited length of the Quarryville Loop that occurs in karst terrain. In the draft EIS we recommended that Transco file a report that further describes karst conditions near the eastern end of the Quarryville Loop and at Compressor Station 200, and any site-specific design and construction practices that Transco would implement to mitigate karst concerns at these facilities, if necessary. Transco complied with our recommendation and filed separate reports for the Quarryville Loop and Compressor Station 200 on May 11 and May 30, 2018, respectively. These reports describe the geophysical and geotechnical methods that were used to identify and evaluate potential subsurface karst features at each facility. We reviewed these reports and found them acceptable. The additional investigation did not identify a risk for karst activity to affect the Quarryville Loop, but subsurface anomalies that could represent karst features were identified at Compressor Station 200. The report for Compressor Station 200 concluded that the anomalies would not pose a direct risk to building foundations but recommended that the compressor building be constructed on mat foundations and that other measures be implemented to prevent sustained ponding of surface water in construction areas and near buildings and minimize stormwater infiltration on the site. Transco has committed to implement these and other measures, which we conclude would adequately reduce the potential for karst activity to adversely affect Compressor Station 200.

Consolidated bedrock would not be encountered during construction, although weathered bedrock could be encountered during grading at Compressor Station 206. Transco does not anticipate the need for blasting but, should it become necessary, Transco would prepare and file a Blasting Plan with the FERC prior to blasting, and blasting would be conducted in accordance with applicable regulations. Transco identified boulders or other rocky substrate in some areas of the seafloor to the east of the Ambrose Channel, and routed the proposed Raritan Bay Loop, in part, to avoid these areas. Transco would incorporate a minor reroute if boulders or other rocky substrate are unexpectedly encountered in the path of the proposed loop during construction.

Two active mineral resources operations, Stavola Contracting and the Trap Rock quarry, were identified within 0.25 mile of the proposed facilities. The NESE Project would not be expected to impact either mineral resource operation, and Transco stated that it would coordinate with the mine operators to ensure that construction and operation activities would not restrict mine access or operations.

The Project area will likely experience hurricane-force winds and flooding during the operating life of the proposed facilities. Because the onshore and offshore pipeline loops would be installed below ground, tropical storm events would be unlikely to impact the facilities. Compressor Station 206 would not be affected by coastal flooding but could be affected by tropical force winds. However, Transco would construct the compressor station in compliance with International Building Code and American Society of Civil Engineers 7 standards, which take into consideration the potential wind forces during an extreme weather event. Transco also sited Compressor Station 206 outside of the 100-year floodplain for Carter's Brook and would construct building foundations 1 foot above the base flood elevation. No 500-year flood hazard areas were identified at the compressor station site. In addition to constructing the compressor station to meet predicted wind forces and siting the aboveground facilities to avoid flood prone areas, Transco would use hydraulic systems to operate control valves in the event of a storm-related electrical failure. As such, we conclude the overall potential for the Project to be significantly impacted by extreme weather events is low.

In its comments on the draft EIS, the NJGS noted that fossil plants, mollusks, invertebrates, and dinosaur trackways could be encountered during construction of the Madison Loop and that fossil discoveries at Compressor Station 206 would not be expected, though are a possibility. To minimize impacts on important paleontological resources, Transco would implement measures outlined in its Unanticipated Discovery Plan for Paleontological Resources, which include training construction personnel to recognize fossil resources and communication with appropriate state scientists to assess the significance of the find and develop an appropriate handling plan, if necessary. We have reviewed the Unanticipated Discovery Plan for Paleontological Resources and find that implementation of the plan would adequately protect paleontological resources that may be encountered during construction.

In summary, the Project would not significantly impact geologic resources and the potential for the proposed facilities to be affected by geologic hazards or extreme weather events is low. These risks would be further reduced by constructing and operating the proposed facilities in accordance with applicable industry standards, regulatory requirements, Transco's Plans and Procedures, other Project-specific plans, and our recommendations.

5.1.2 SOILS

The NESE Project would traverse a variety of soil types and conditions, including the potential to encounter acid-forming soils along the Madison Loop. Construction activities such as clearing, grading, trenching, and backfilling, could adversely impact soil resources by causing erosion, compaction, and the introduction of excess rock or fill material to the surface, which could hinder restoration. However, Transco would implement mitigation measures contained in its Plan to control erosion and enhance successful restoration. Specifically, soil impacts would be mitigated through measures such as topsoil segregation, temporary and permanent erosion controls, decompaction, and post-construction restoration and revegetation of work areas. Transco developed an Acid Producing Soils Control Plan which includes methods that would be implemented to manage acid-producing soils during construction. This plan was approved by the Freehold Soil Conservation District. Transco would also implement Project-specific plans to avoid and limit inadvertent spills of fuel and other hazardous substances, and to address pre-existing contaminated soil if encountered.

In summary, construction-related impacts on soils would be temporary and localized to the construction workspace, except where erosion, sedimentation, landslides, and other forms of soil movement affect adjacent areas. However, construction impacts on soil resources would be minimized and mitigated through implementation of the measures in Transco's construction and restoration plans. About 28.3 acres of soil would be permanently affected by access roads and aboveground facilities, but this impact is nominal when compared to the extent of the resource in the Project area.

5.1.3 WATER RESOURCES

5.1.3.1 Groundwater

The majority of Project construction would occur above the shallow, surficial aquifers that typically occur in unconsolidated deposits in the Project area; therefore, most direct impacts on groundwater resources would be avoided. Groundwater quality could be impacted primarily by increased turbidity during construction; however, this impact would be temporary, minor, and localized, and would be further reduced by restoring surface contours to pre-construction conditions and implementing other measures in Transco's Plan and Procedures to minimize construction time and erosion. After construction, Transco would conduct soil decompaction as necessary, restore the ground surface as closely as practicable to original contours, and revegetate any previously vegetated areas to restore pre-construction overland flow patterns and groundwater recharge.

Shallow groundwater resources could also be vulnerable to contamination caused by an inadvertent spill of hazardous materials during construction. Transco would implement measures within its Spill Plan to prevent hazardous material spills and minimize the impact of a spill should one occur. We also received comments that the storage and handling of hazardous materials at Compressor Station 206 would pose a serious risk to groundwater resources in the area. Transco would store hazardous materials in vessels and containment structures that are specifically designed to safely contain hazardous chemicals in accordance with applicable DOT, state, and local requirements. In addition, Transco's facilities, including hazardous material storage systems, would be subject to inspection by local fire prevention authorities, which would further reduce the potential for an accidental spill. For these reasons, we conclude that the storage and use of fuel and other hazardous liquids during construction and operation of the Project would not represent a significant risk to groundwater resources.

Prior to and after issuance of the draft EIS, we received comments expressing concern that construction and operation of Compressor Station 206 could encounter and exacerbate existing groundwater contamination associated with the adjacent Higgins Farm Superfund site, or adversely affect the EPA's ongoing groundwater remediation at the Higgins Farm site. The primary contaminants of concern in groundwater are VOCs, and EPA data indicates that VOC concentrations are generally decreasing over time and have significantly degraded in the bedrock aquifer downgradient of bioremediation sites (toward Compressor Station 206). Based on groundwater monitoring results, the PCE plume (one of the primary VOCs of concern) is about 400 feet from construction workspaces at Compressor Station 206 and about 850 feet from the proposed compressor building. In addition, the highest water level elevation measured in EPA monitoring wells on the compressor station site is about 30 feet below the proposed facility, whereas Transco anticipates a maximum excavation depth of 15 feet at the site. Transco's construction plans were reviewed by the EPA, who is assisting us in our environmental review of the NESE Project. The EPA finds, and we agree, that construction and operation of Compressor Station 206 as proposed by Transco is not expected to affect EPA's ongoing cleanup operations at the site.

Groundwater contamination could also be encountered during construction of the Madison Loop. Transco provided an Unanticipated Discovery of Contamination Plan for all aspects of the NESE Project which we reviewed and found would avoid or adequately minimize potential impacts associated with handling unanticipated, pre-existing, contamination. In addition, due to Transco's recent experience with contaminated groundwater during construction of the New York Bay Expansion Project, we recommended in the draft EIS that Transco file an updated Materials and Waste Management Plan that details the specific measures, including regulatory coordination, that Transco would take to properly manage pre-existing contaminated groundwater if encountered during construction of the Madison Loop. Transco complied with our recommendation and filed the updated plan on May 11, 2018. Transco's Materials and Waste Management Plan was developed in accordance with the guidelines set forth in the NJDEP's Linear Construction Project Technical Guidance, dated January 2012. The plan describes how contaminated and hazardous materials sites were identified along the Madison Loop; the location of these sites relative to the Project facilities; potential investigations prior to construction; the measures that would be implemented to manage contaminated media of a tract-by-tract basis; and the reporting requirements following construction of the Project. We find that implementation of the Materials and Waste Management Plan would ensure that the Project does not exacerbate previously existing contamination and that contaminated media would be managed appropriately if encountered during construction.

Construction of the Project could damage water supply wells within the construction workspace or result in increased turbidity and reduced capacity in nearby water supply wells and springs. A hazardous material spill could also impact a water supply well if the spill were to contaminate groundwater within the capture zone of the well. In general, the potential to impact nearby wells is low because most Project construction would occur above the water table and most wells are screened well below construction depth. As noted above, Transco would avoid or minimize impacts due to hazardous material spills by implementing the measures in its Spill Plan. In addition, Transco would seek well owner permission to conduct pre- and post-construction testing of water quality and yield. If construction-related activities temporarily affect water quality or yield of domestic or public wells or springs, Transco would provide an alternative water source and/or other compensation to the well owner(s). If construction-related activities permanently affect a well or spring, Transco would repair, replace, or provide an alternative source of potable water. Transco is continuing to identify nearby wells and springs, and field-verified data is preferred to precisely identify mitigation measures for individual well owners and set clear expectations for construction compliance. Therefore, we are recommending that Transco file a final table identifying all water supply wells and springs, field-verified, within the construction workspaces and all other wells and springs within 150 feet of the Project workspaces. In addition, Transco has not yet identified measures to protect wells within the construction workspace from physical damage. Although standard industry practice is to flag and fence wells within workspaces with a specified protective buffer and we conclude these measures are likely implementable to avoid physical damages, we are also recommending that Transco describe the measures that Transco would implement to protect any wells or springs within construction workspaces from physical damage. We conclude that these plans would adequately protect water supply wells in proximity to the Project.

The use of the HDD method on the Madison Loop and onshore segment of the Raritan Bay Loop could potentially impact groundwater resources primarily due to increased turbidity. The magnitude and duration of increased turbidity would depend on the volume of fluid lost and would diminish with distance and time from the point of loss. To minimize potential impacts on groundwater resources, Transco would implement its Onshore Horizontal Directional Drill Contingency Plan, which includes measures to monitor drilling progress and minimize the potential for drilling fluid loss to occur. We reviewed Transco's contingency plan and find that it would reduce the potential for, and magnitude of, an inadvertent loss of drilling fluid. After issuance of the draft EIS, we continued to receive comments expressing concern about the potential toxicity of HDD drilling fluid. Drilling fluid is composed of 95 to 98 percent water and 2 to 5 percent bentonite, a naturally occurring clay mineral that is used to thicken the fluid. Bentonite-based drilling fluid is a non-toxic, non-hazardous material that is also used to construct potable water wells throughout the United States. If needed to optimize drilling operations, Transco may augment the drilling fluid with starch, cellulose, non-toxic polymers, and/or crystalline silica. In general, the additives would be NSF/ANSI 60 approved. Transco has committed to file the safety data sheets for all drilling fluid additives for the FERC's review and approval prior to construction and would also provide the safety data sheets to the NJDEP. As such, we conclude that use of the HDD method would not pose a significant risk to groundwater resources.

Water use requirements during operation of Compressor Stations 200 and 206 would be minimal. At Compressor Station 206, Transco intends to connect to the existing municipal water supply system in the area, which Franklin Township is planning to upgrade. Transco stated that it would install a potable water tank for temporary operational water use if the municipal repairs are not completed before Compressor Station 206 goes into service.

In summary, construction and operation of the NESE Project would not result in significant impacts on groundwater resources, and potential impacts would be further avoided or minimized by implementing Transco's construction and restoration plans and our recommendations and by complying with other regulatory permit conditions that are protective of water resources.

5.1.3.2 Onshore Surface Water Resources

Twenty-six waterbodies would be affected by the NESE Project, including 10 perennial, 11 intermittent, 4 ephemeral, and 1 open water pond/reservoir. Nineteen of these waterbodies are crossed by the pipeline centerline, including one major waterbody on the Madison Loop (an unnamed tributary to Cheesequake Creek) that would be crossed using the HDD method and which would also be used as a source of hydrostatic test water. Of the remaining 7 waterbodies, 5 would be within the Project workspace and 2 would be crossed by the new permanent access road to Compressor Station 206.

Transco would use dry-ditch crossing methods to install the proposed pipelines across waterbodies including flume, dam and pump, and temporary diversion channel methods. Dry-ditch crossing methods divert flow around the workspace, thus minimizing turbidity and sedimentation while maintaining flow upstream and downstream from the crossing location. Transco would implement other measures included in its Procedures that are designed to avoid and minimize impacts on waterbodies including limiting the amount of time to complete each crossing, prohibiting fueling within 100 feet of a waterbody, and restoring the streambed and banks upon construction completion. As a result, impacts on waterbodies would be temporary to short-term and minor.

The HDD method would avoid direct impacts on waterbodies, but indirect impacts could occur if drilling fluid is inadvertently released into the waterbody during drilling operations. The primary impacts that an inadvertent release of drilling fluid would have on a waterbody would be increased turbidity and sedimentation downstream from the release. These impacts would be temporary and would decrease with time and distance from the release and, thus, would not be significant. Transco would implement its Onshore Horizontal Directional Drill Contingency Plan, which includes measures to identify and minimize the potential for lost drilling fluid, minimize the duration of any releases that occur, and contain and clean up drilling fluid on the land surface. We reviewed Transco's onshore HDD designs, feasibility studies, and Onshore Horizontal Directional Drill Contingency Plan, and conclude that implementation of these plans would reduce the potential for lost drilling fluids to occur and minimize impacts on resources in the event of lost returns.

Transco would use about 7.9 million gallons of water from surface waters and municipal sources for hydrostatic testing and to construct HDDs. Impacts associated with the withdrawal and discharge of water would be minimized by Transco's adherence to their construction plans and compliance with state water withdrawal and NPDES discharge permits.

The Project would cross SWPAs associated with public surface water supplies and could impact waterbodies within 3 miles upstream from public surface water intakes. The primary impact that could occur on public surface water intakes would be increased turbidity, which we expect would be minor and temporary. Water quality at public surface water intakes could also be affected by hazardous materials spills. Transco would avoid and minimize the impact of a hazardous material spill by implementing the measures detailed in its Spill Plan, which we reviewed and found to be protective of surface and groundwater resources. At our request, Transco developed and submitted Notification Plans to the operators of public water systems in the Project area that utilize surface water for at least a portion of their water supply. In the draft EIS, we requested that the public water system operators comment on the adequacy of the Notification Plans; however, no comments were received.

In summary, pipeline construction activities affecting surface waters would be conducted in accordance with Transco's Procedures, along with any conditions that are part of other federal or state water approvals. We conclude that with these measures, along with our additional recommended mitigation measures, impacts on surface waters would largely temporary and minor.

5.1.3.3 Offshore Surface Water Resources

Offshore surface water resources crossed by the Raritan Bay Loop include Raritan Bay and Lower New York Bay. Our conclusions related to Project impacts on offshore surface water resources are presented relative to Project effects on aquatic wildlife in section 5.1.5.2.

5.1.3.4 Wetlands

Construction and operation of the Project would temporarily and permanently affect 12.5 and 3.9 acres of wetlands, respectively. Construction of the Project would temporarily affect 5.7 acres of PEM wetlands, 3.0 acres of PFO wetlands, 3.0 acres of E2EM wetlands, and 0.6 acre of PSS wetlands. Operation of the Project would permanently affect 2.7 acres of PFO wetlands, 0.8 acre of PEM wetlands, and 0.4 acre of PSS wetlands. Most impacts on PEM, PSS, and E2EM wetlands would be temporary to short-term and localized to the area of disturbance, whereas impacts on PFO wetlands would be long-term to permanent.

Wetland impacts would be avoided by collocating the proposed onshore pipeline loops with Transco's existing Mainline system for 98 percent of their length; allowing the use of up to 100 feet of existing, maintained right-of-way during construction; and typically requiring only a 25-foot-wide expansion of the existing right-of-way during operation. Direct impacts on wetlands would also be avoided by use of the HDD method at three locations along the Madison Loop. The ancillary facilities (e.g., MLVs, launchers/receivers, and CP systems) were also sited to avoid wetland impacts, and construction at existing Compressor Station 200 would not impact wetlands. Construction and operation at new Compressor Station 206 would impact 3.9 and 3.7 acres of wetlands, respectively. As required by our Procedures, Transco sited the compressor station itself to avoid wetlands, but wetland impacts could not be completely avoided by the access road or inlet and outlet pipelines.

Where wetlands could not be avoided, Transco would minimize impacts and restore the construction right-of-way in accordance with its Procedures and in compliance with conditions of section 404 and 401 permits issued for the Project. More specifically, vegetation clearing in wetlands would be limited to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. Stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trenchline to avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland. Transco would limit the type of equipment (e.g., low ground pressure equipment, trenching and backfilling equipment) allowed to access wetland areas, and would implement weight dispersing devices such as timber mats to proactively address compaction and rutting issues. Additionally, machinery would operate on one side of the trench (working side), and excavated materials would be stockpiled on the other (nonworking side).

Sediment barriers would be installed and maintained adjacent to wetlands and within ATWS as necessary to minimize the potential for sediment runoff. Hydrology would be maintained by installing trench breakers at the wetland/upland boundary, sealing the trench bottom where necessary, and by restoring wetlands to original contours. Prior to backfilling, Transco would install permanent trench breakers where necessary to prevent the subsurface drainage of water from wetlands. During operation, Transco would maintain a 10-foot-wide swath of vegetation within wetlands centered over the pipelines in an herbaceous state, and would selectively cut and remove trees within 15 feet of the pipeline to maintain pipeline integrity.

The USACE and designated state agencies may require mitigation for unavoidable wetland impacts to preserve no net loss of wetland function. In Pennsylvania, the USACE Baltimore District issued its Section 404 permit on May 29, 2018 and determined that no mitigation was required for wetland impacts associated with the Quarryville Loop, and on October 26, 2017 the PADEP issued an Administrative Jurisdictional Determination indicating that a wetland permit was not required for Transco's proposed activities at Compressor Station 200. In New Jersey, the USACE New York District does not require compensatory mitigation for Project-related wetland impacts under its jurisdiction (see section 1.2.3), but Transco is continuing to consult with the NJDEP regarding potential mitigation for wetland impacts under its jurisdiction. Transco, in consultation with the NJDEP, would prepare Project-specific wetland mitigation plans to maintain no net loss of wetlands and to adequately replace lost functions. As a part of the state permitting processes, written approval of the mitigation plan would be obtained from the appropriate agencies prior to construction.

By avoiding, minimizing, and mitigating for wetland impacts as summarized above, we conclude that the Project would not result in significant wetland impacts.

5.1.4 VEGETATION

Impacts on upland vegetation from the NESE Project would range from temporary to permanent due to the varied amount of time required to reestablish certain community types, as well as the maintenance of herbaceous and shrub vegetation within the permanent right-of-way and the conversion of aboveground facility locations and new permanent access roads to non-vegetated areas. Construction of the Project would affect about 274.0 acres of vegetation, including about 35.0 acres of upland forest vegetation (deciduous, coniferous, and mixed). Operation of the Project would affect about 50.2 acres of vegetation, including about 16.1 acres of upland forest vegetation (deciduous, coniferous, and mixed). While about 34.1 acres of open vegetation types (grassland/herbaceous, barren) would remain within the permanent right-of-way, most of this acreage would return to its original vegetative type during operation of Project facilities.

In general, impacts on vegetation resources would be minimized by collocating the Quarryville and Madison Loops with Transco's existing right-of-way for 98 percent of their length, reducing the area affected by construction and resulting in a nominal expansion of the existing, maintained right-of-way. Transco would further minimize impacts on upland vegetation by implementing the measures outlined in its Plan, including topsoil segregation and replacement, mitigation of compacted soils, and the use of erosion controls. After construction, Transco would seed the affected areas using seed mixes recommended by the NRCS, local agencies or organizations, or relevant landowner agreements. Impacts in agricultural areas would be further minimized by implementing measures described in Transco's Agricultural Construction and Monitoring Plan, which specifies, among other practices, topsoil segregation and replacement, rock removal, deep tilling to mitigate soil compaction, and drain tile identification and repair.

The Quarryville Loop would also cross the Fishing Creek at Scalpy Hollow Road NHA and the Midway Station, Wissler Run NHA for a total of 0.5 mile. The Fishing Creek at Scalpy Hollow Road NHA contains Species of Concern Core Habitat for the glade spurge, a state-endangered plant species; however, the Quarryville Loop would not cross suitable habitat for this species within the NHA, and the PADCNR did not identify this species as having the potential to occur in the Project area. Therefore, impacts on this species are not anticipated. The Midway Station, Wissler Run NHA contains Species of Concern Core Habitat for four state-listed species (Bradley's spleenwort, lobed spleenwort, American holly, and cranefly orchid). The Quarryville Loop would not cross suitable habitat for the Bradley's spleenwort or lobed spleenwort and the PADCNR did not identify the cranefly orchid as having the potential to occur in the Project area. At the request of the PADCNR, Transco conducted surveys for the American holly along the Quarryville Loop in August 2016. Two individuals of American holly were documented within the construction right-of-way for the Project; however, the PADCNR concluded that impacts on the two individuals would not adversely affect the species as a whole and no further coordination is necessary for the Project.

Transco would implement its Noxious Weed and Invasive Plant Management Plan, which outlines methods to prevent, mitigate, and control the spread of noxious and invasive weeds during ground-disturbing activities. In general, vehicles and equipment would be inspected and cleaned of soils, vegetation, and debris before they are brought to the Project area or moved to another work area within the construction right-of-way. Following construction, Transco would monitor the right-of-way for invasive species and, if identified, would consult with a state-certified applicator and applicable regulating agency to determine the most effective method of control.

In summary, we conclude that implementation of the measures outlined in Transco's Plan, Agricultural Construction and Monitoring Plan, and Noxious Weed and Invasive Plant Management Plan, would adequately minimize impacts on upland vegetation resources.

5.1.5 WILDLIFE AND AQUATIC RESOURCES

5.1.5.1 Onshore Wildlife Resources

The NESE Project would impact wildlife species and their habitats. Impacts from construction include the displacement of wildlife from work spaces into adjacent areas and the potential mortality of some less mobile individuals. Vegetation removal could also reduce the amount of available habitat for nesting, cover, and foraging, and construction could lower reproductive success by disrupting courting, nesting, or breeding of some species, which could also result in a decrease in prey available for predators of these species. Most impacts would be temporary, lasting only while construction is occurring, or short-term, lasting no more than a few years until preconstruction habitat is reestablished. Other impacts would be longer term such as the re-establishment of forested habitats, which could take decades.

We received comments concerning the potential effects of forest fragmentation on wildlife resources. Forest fragmentation associated with the onshore loops would be minor as about 97 percent of the Quarryville Loop and 100 percent of the Madison Loop would be collocated with Transco's existing, cleared and permanently maintained right-of-way, and because only 2.6 acres of upland forest would be permanently affected along the 13.4 miles of looping. The widening of the existing right-of-way in forested areas would not significantly increase the amount of existing edge habitat, and the relatively small widening (typically 25 feet) of permanently cleared right-of-way would be unlikely to impede the movement of most forest interior species. Regarding aboveground facilities, construction of Compressor Station 206 and interconnecting pipeline would result in the removal of 13.4 acres of upland forest from a generally rectangular area near the edge of an existing pasture and between three nearby maintained linear rights-of-way that cross the area. An additional 3.2 acres of upland forest would be removed during construction of the access road to the facility. The access road would generally parallel the edge of the pasture, and the interconnecting pipelines would closely parallel one of the existing, maintained rights-of-way. After construction, the existing forested areas to the north, east, and south of the site would remain and continue to provide habitat to local wildlife. Thus, we would not expect forest fragmentation to be significant due to the location of the compressor station in an area where wildlife has adapted to existing development on and near the site. Construction and operation at Compressor Station 200 would occur within the existing fence line of the facility, where wildlife is already acclimated to the permanent noise and lighting associated with the facility; as such, no significant additional effects on wildlife resources would be expected.

A variety of migratory birds, including BCC-listed birds and species occupying IBAs, are associated with the habitats that would be affected by the Project. Project construction could affect raptors and migratory birds if it would take place during the nesting season. In addition, the loss of about 35.0 acres of upland forest and 3.0 acre of forested wetland during Project construction would present a long-term impact for migratory birds that depend on forest. Raptors and migratory birds could also be affected during Project operation, which would permanently convert approximately 2.6 acres of upland forest and less than 0.2 acre of wetland forest to an herbaceous state along the pipeline right-of-way, and result in the permanent loss of 13.5 acres of upland forest and 2.6 acres of forested wetland at aboveground facilities and permanent access roads. Based on the reduced construction-related impacts on forest habitat resulting from collocation of the Quarryville and Madison Loops with Transco's existing pipelines, and implementation of Transco's Plan and Procedures, which require that maintenance of the permanent right-of-way during operations occur outside of the state-specific migratory bird time of year restrictions, we conclude that impacts on migratory bird populations would not be significant. To further avoid or reduce construction-related impacts on migratory birds, Transco would implement the measures in its final Migratory Bird Plan, including times of year when construction should be avoided. The FWS field offices provided recommendations to Transco regarding migratory bird avoidance and minimization measures that Transco included in its final Migratory Bird Plan.

Construction of the Project would temporarily impact about 114.9 acres of pollinator habitat. The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators. Transco committed to revegetating areas disturbed by construction using seed mixes that are native to the region and benefit migratory birds and pollinators. Transco continues to coordinate with the FWS, NRCS, state resource management agencies, and soil conservation districts to identify seed mixes and practices to be used during construction to promote pollinator health and potentially provide a net benefit to pollinators in areas where pre-construction vegetation lacks pollinator habitat.

Based on the above discussion and Transco's implementation of the measures in its Plan and Procedures which are designed to minimize impacts, reduce construction time, and ensure revegetation, as well as our recommendations, we conclude that constructing and operating the Project would not significantly affect common wildlife species at population levels.

Construction impacts on freshwater aquatic resources may include direct contact by construction equipment; alteration or removal of adjacent riparian vegetation and aquatic habitat cover; introduction of pollutants; and impingement or entrainment of fish and other biota associated with the use of water pumps, including appropriation of hydrostatic test water. Aquatic resources could also be impacted by increased sediment and turbidity within and immediately downstream of waterbody crossings and hydrostatic test water discharge locations, or if drilling fluid from HDD operations would enter a waterbody.

Transco proposes to construct across all waterbodies with perceptible flow at the time of crossing using dry-ditch crossing methods (i.e., flume, dam and pump, temporary diversion channel method, or HDD), which maintain the flow of the waterbody during the crossing, thereby reducing impacts. Transco would also implement other measures outlined in its Procedures to reduce sedimentation and enhance restoration, as well as its Onshore Horizontal Direction Drill Contingency Plan, which includes measures to monitor the drilling operation and drill path to identify and minimize the potential for inadvertent returns, minimize the duration of any releases that occur, and contain and clean up any spills. Impacts on fishery resources would be further minimized by completing in-stream work during agency-specified construction windows. However, the timing window for crossing saline estuarine waterbodies along the Madison Loop has not yet been determined. Transco is coordinating with the NJDEP to determine the proper timing restriction for saline estuarine waterbodies and, as required in our Procedures, Transco would be required to provide documentation from the NJDEP for waterbody construction time windows that differ from our Procedures.

We expect streambeds and banks to quickly revert to preconstruction conditions. Transco's commitment to conduct restoration, bank stabilization, and revegetation efforts in accordance with its Procedures and all applicable state and federal permits would minimize the potential for erosion from the surrounding landscape. No long-term impacts are anticipated after restoration of stream bottoms and regrowth of stream bank and aquatic vegetation.

Based on Transco's proposed measures and our recommendation, we conclude impacts on aquatic resources associated with waterbody crossings would be minor, temporary, and limited primarily to the area of the crossings.

5.1.5.2 Offshore Wildlife Resources

The Raritan Bay Loop is located in a marine area that supports EFH for 33 species, diadromous and marine fisheries, and a number of fish and invertebrate species with ecological, commercial, or recreational importance. None of the managed species with EFH in the Project area are listed as endangered or threatened under the ESA; however, Atlantic bluefin tuna, dusky shark, and sand tiger shark are listed as Species of Concern by the NMFS. Based on Transco's consultation with the NMFS and our own research, we have identified 16 additional NOAA Trust Resource species that could be adversely affected by the Project.

The primary impacts that construction of the offshore pipeline loop could have on aquatic resources including EFH and EFH species would be due to increased turbidity, sedimentation, and resuspension of contaminated sediments associated with seafloor disturbance, and noise associated with pile driving and hydrographic surveys. Other construction related activities could also impact aquatic resources including the withdrawal and discharge of hydrostatic test water, vessel movement, the inadvertent release of HDD drilling fluid, and accidental spills of hazardous materials. Operation of the Project would not significantly affect fisheries resources. The NMFS provided recommended conservation measures regarding EFH, and the EFH Assessment has been updated to include our responses to these measures. Therefore, we conclude that EFH consultation under the MSA is complete.

Transco identified a 14,165.5-acre offshore workspace primarily to accommodate the anchor spread around work barges, but of this area, only an estimated 87.8 acres of seafloor would be directly affected by excavations, pipelay, anchoring systems, and backfilling activities. Transco conducted sampling to determine the chemical and physical characteristics of sediments along the pipeline route and performed modeling to predict the turbidity and sediment deposition that would result from each sediment-disturbing activity. The modeling determined that approximately 947.4 acres of seafloor would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediment and that TSS exceeding ambient conditions by 100 mg/L would extend a maximum of 3,150 feet from clamshell excavation activities, although 14.9 miles (64 percent) of the Raritan Bay Loop would be installed using a jet trencher, resulting in sediment plumes extending only 262 feet to 1,345 feet from the source. In the worst-case excavation scenario, TSS would return to ambient conditions within 7.9 hours after sediment disturbance. For backfill placement activities, sediment modeling indicated that TSS concentrations exceeding ambient conditions by 100 mg/L would extend up to 5,151 feet from the source but would return to ambient conditions within 3.5 hours.

Direct impacts on offshore resources due to seafloor disturbance would include mortality, injury, or temporary displacement of the organisms living on, in, or near the area directly affected by the Project. Increased turbidity could clog fish gills and obscure visual stimuli, and the redistribution of sediments could bury benthic and demersal species, resulting in mortality of eggs and other life stages. Seafloor-disturbing activities could also resuspend sediment-bound contaminants into the water column, which could expose biota to contaminants and have a direct negative impact on managed species and other aquatic organisms. To predict the transport and fate of contaminants that may be resuspended by Project construction, Transco conducted contaminant transport modeling for analytes that exceeded Class C thresholds and high Class B concentrations in sediment samples. Based on the modeling results, maximum contaminant concentrations would generally be below chronic toxicity levels at the edge of the 500-foot mixing zone. For some conservative modeling scenarios involving high excavation rates and continuous dredging, water quality standards for mercury and copper would not be met at the edge of the 500-foot mixing zone. Transco would be required to adhere to New York and New Jersey state water quality standards, and the NYSDEC has indicated that monitoring of the water column for turbidity and chemical contaminants would be required to ensure compliance with state water quality standards. Transco has agreed to the NYSDEC's request to utilize an environmental bucket for clamshell dredging and would also prevent scow overflow in areas where Class C sediments are present. Transco has also committed to monitor turbidity during construction and would employ best management practices, such as slowing the rate of dredging, to reduce excessive turbidity.

We anticipate that impacts on aquatic resources due to seafloor disturbance would be minor as pelagic fish, sea turtles, and marine mammals would likely temporarily vacate the affected area to avoid the disturbance. Benthic invertebrates and demersal (bottom-dwelling) fish species in or near areas directly impacted by construction would be most affected, but we expect that affected benthic communities would re-establish within a short time as native assemblages recolonize the area or a new community develops. Given the rapid pace at which resuspended sediments would settle out of the water column, we also anticipate that impacts of sedimentation and turbidity on aquatic resources, including suspension and redeposition of contaminated sediments, would be temporary and minor. Impacts on aquatic resources would be further reduced by avoiding or minimizing construction during the time of year when special status species may be present in the area or during certain periods of development. Transco is continuing to coordinate with the NYSDEC, NJDEP, and NMFS to define construction timing and work restrictions and has committed to restrict work in sensitive areas as much as possible.

To confirm that construction would not significantly impact aquatic resources, we are recommending that, prior to construction of the Raritan Bay Loop, Transco provide the final volume of dredge material for disposal; the final onshore and offshore dredge disposal sites; and agency comments for disposal sites. We are also recommending that Transco file documentation of agency consultations regarding its final proposed mitigation for fisheries and any other aquatic resources, including timing restriction commitments and allowable work within these periods prior to construction of the Raritan Bay Loop. Further, to verify that benthic communities recover as expected, we are recommending that, prior to construction of the Raritan Bay Loop, Transco file a post-construction benthic sampling and monitoring plan. In New Jersey, Transco may further mitigate impacts on shellfish areas through a monetary contribution to NJDEP's dedicated account for shellfish habitat mitigation, in accordance with NJAC 7:7-17.9.

Transco proposes to install a total of 163 temporary piles, ranging in size from 10 inches in diameter to 60 inches in diameter. Of the 163 piles, 34 piles would be installed via a combination of diesel impact hammer and vibratory device. The remainder of the piles would be installed with vibratory devices. Transco estimates a total of 72 hours for pile installation, of which about 31 hours would be impact pile driving and about 41 hours would be vibratory pile driving. Transco estimates a total duration of 46 hours for pile removal, which would be accomplished with a vibratory device. Potential noise impacts include temporary or permanent impacts on fish auditory systems that could reduce the survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success. Transco's acoustic modeling results indicate that the noise generated by pile driving would exceed both the injury and behavioral disturbance thresholds for fish. The 150 dB re 1 μPa behavioral disturbance threshold for fish would be exceeded up to 705 feet from the source for vibratory pile driving, and up to 32,808 feet (6.2 miles) from the source for impact pile driving. Pile driving would exceed the 206 dB re 1 μPa peak sound pressure injury threshold for fish within a limited area, approximately 59 feet from the source. Areas exceeding the injury threshold for fish for cumulative exposure to pile driving ranged from 3,271 to 7,037 feet (0.6 to 1.3 miles). An individual fish would need to remain within this area during the entire duration of the pile driving event to experience an injury. Additionally, these zones would be constricted by land, and some of the pile driving noise is likely to be masked by ambient noise at distances shorter than those predicted by the noise modeling. Though the duration of construction activities would be limited and most fish species would be able to leave the area of disturbance, harassment or injury of individual fish due to pile driving noise is possible. Pile driving and other construction-related noise impacts on fish are expected to be temporary and moderate and population-level impacts due to construction noise are not expected. We have recommended that Transco file a noise monitoring and mitigation plan to ensure that actual noise is consistent with the predicted values and/or to reduce the noise to acceptable levels. Additionally, Transco is continuing to coordinate with NYSDEC, NJDEP, and NMFS to define allowable work during timing restriction windows for marine species.

Acoustic modeling indicates that impact pile driving could result in sound levels capable of causing marine mammal behavior disturbance up to 13.4 miles from the source for the largest piles. Vibratory pile driving and pile removal could conservatively result in sound levels capable of causing marine mammal behavioral disturbance up to 1.3 miles from the source for the largest piles. Given the amount of existing vessel traffic noise in the Project area, as well as noise monitoring reports from other recent underwater pile driving activities, we expect that the sound generated by pile driving would be masked by underwater ambient noise at much shorter distances. The modeling also indicates that impact pile driving noise levels at which permanent auditory damage could occur would be exceeded for all functional hearing groups present in the Project area, ranging from a minimum of 568 feet for mid-frequency cetaceans to a maximum of 18,973 feet (3.6 miles) for high-frequency cetaceans. Vibratory pile driving and pile removal is expected to exceed the PTS thresholds for all functional hearing groups present in the Project area; however, this exceedance would occur within a relatively limited area around the sound source (i.e., less than 331 feet). Given that the auditory injury thresholds are with respect to cumulative sound impacts, a marine mammal would need to spend approximately 24 hours within this zone of exceedance to potentially experience a permanent hearing impact. Marine mammal densities in the Project area are low, and individual marine mammals would be unlikely to remain in the zone of exceedance long enough to be injured by pile driving noise. Additionally, the modeled zones of the exceedance would be constricted by land and somewhat smaller than predicted by the modeling. Noise associated with other in-water construction methods (e.g., jet trencher, clamshell dredging), vessel traffic, and hydrographic surveys would be of limited duration and extent and, thus, would not be expected to substantially disturb marine mammals. Transco is consulting with the NMFS and has submitted a draft application for an IHA for Level B harassment. Transco expects that its final IHA application will request Level B takes of up to 10 marine mammal species that may be present in the vicinity of the Raritan Bay Loop during construction: gray seal, harbor seal, harp seal, bottlenose dolphin, harbor porpoise, short-beaked common dolphin, fin whale, North Atlantic right whale, humpback whale, and minke whale. Level A takes would not be expected from the Project due to the limited duration of the pile driving activities and low marine mammal densities in the area. Transco would also implement the measures in its Marine Mammal Observer Training and Response Protocol Plan during offshore construction to minimize impacts on marine mammals and protected species, and provide the NMFS with a monitoring report within 90 days after the conclusion of the monitoring. As noted above, to ensure that the actual noise is consistent with the predicted values, we are recommending that, prior to construction of the Raritan Bay Loop, Transco file a pile driving noise monitoring and mitigation plan that describes how noise monitoring would be conducted and the mitigation measures that Transco would implement to reduce noise to acceptable levels if the noise exceeds predicted levels. By constructing the Raritan Bay Loop in accordance with measures that may be included in the NMFS IHA, Transco's plans, and our recommendations, construction noise would not have a significant impact on marine mammals in the Project area.

The release of HDD drilling fluid in the offshore environment could increase turbidity and sedimentation in the vicinity of the release, resulting in a similar, limited impact on aquatic resources as discussed above in conjunction with seafloor disturbing activities. Transco proposes to contain the drilling fluid and cuttings within the HDD entry and exit pits as drilling progresses. Based on the density and cohesive properties of the drilling fluid in saltwater, the material is expected to remain stable at the bottom of the pit and not escape into the surrounding area. An inadvertent release of drilling fluid could also occur during HDD activity. Transco would utilize the intersect method when drilling the water-to-water HDD crossing of the Ambrose Channel and other measures detailed in its Offshore Horizontal Directional Drill Contingency Plan to reduce the potential for an inadvertent release to occur during drilling, as well as measures that would be undertaken in the event of an inadvertent release. We have reviewed Transco's HDD designs and contingency plan and conclude that their implementation as proposed would minimize the likelihood and impact of an HDD drilling fluid release.

Approximately 3,489,482 gallons of seawater would be used for hydrostatic testing of the Raritan Bay Loop. A mesh screen would be used on the water intakes; however, organisms that can physically fit through the mesh on the intake screen could become trapped (entrained) in the pipeline, and larger organisms could be impinged on the screen. While all entrained organisms would likely perish, adverse effects at the population level would not be expected due to the small area likely to be influenced by the intake, and the short duration of the withdrawal operation. Transco would introduce the biodegradable additive CORRTREAT 15316 into the hydrostatic test water to prevent pipeline corrosion. The test water would also be treated with a non-toxic fluorescent dye, Hydro Tag Clear, to help detect potential leaks. Following the completion of each test, the water would be discharged back into the marine environment through a multi-port diffuser in accordance with applicable standards and permits. This would re-oxygenate and mix the discharged water with the surrounding seawater thereby dispersing (diluting) the concentration of additives in the test water. Due to the low concentrations of additives expected in the discharge, the results of Transco's toxicology testing, and the short-term nature of the discharge, hydrostatic testing would not be expected to cause adverse effects on aquatic resources.

Construction vessel traffic would increase the potential for collision or injury to larger offshore species; however, the effect would be small and localized relative to existing traffic into and out of the busy Port of New Jersey and New York. Transco would implement its Marine Mammal Observer Training and Response Protocol Plan and utilize NMFS-approved observers to monitor for protected species and marine mammals during construction activities. As such, the impact of vessel traffic and vessel strikes on offshore resources would be temporary and negligible.

Offshore wildlife and aquatic resources could be affected by a spill of hazardous materials or by ingesting or becoming entangled in trash and debris. Transco would comply with USCG requirements for the prevention and control of oil and fuel spills, and would be required to register for the EPA NPDES Vessel General Permit, which includes measures to protect against impacts associated with discharges incidental to the operations of commercial vessels. Transco would also adhere to the USCG marine trash policy, and implement the measures in its Spill Plan to identify, control, and clean up any accidental leaks or spills from offshore construction. Therefore, we conclude significant impacts from spills and debris on offshore wildlife and aquatic resources would be avoided.

5.1.6 THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

Special status species are those for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species classified as threatened or endangered; species considered as candidates or petitioned for federal listing by the FWS or the NMFS; and species that are designated as state-listed or receive special management considerations by Pennsylvania, New Jersey, or New York State.

To comply with section 7 of the ESA, we consulted either directly or indirectly (through Transco's informal consultation) with the FWS, NMFS, and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the Project area. We determined that 23 federally listed species may occur in the Project area. We determined that no critical habitat for any federally listed species is present in the Project area. Due to the distance of their primary habitat from the Project area or the absence of individuals observed during field surveys, it was determined that the Project would have *no effect* on 7 of the 23 listed species. Based on our analysis, we conclude that the Project *may affect, but is not likely to adversely affect* 12 of the federally listed species; *may affect, and is likely to adversely affect* 3 federally listed species including the North Atlantic right whale, fin whale, and Atlantic sturgeon, due to potential pile driving noise impacts; and *may affect, but is not likely to jeopardize* 1 federally proposed threatened species.

We have requested that the FWS and the NMFS consider the EIS as our official BA for the NESE Project. In addition, because we have not yet completed our consultations with the FWS and NMFS for federally listed and proposed species, we are recommending that Transco not begin construction until the staff receives comments from the NMFS regarding the Project; the staff completes formal consultation with the NMFS; staff completes conference with the FWS, if required; and Transco has received written notification from the Director of OEP that construction or use of mitigation may begin.

In addition to the federally listed species, 25 state-listed species could occur in the vicinity of the Project. Based on our analysis, we conclude that the Project would not adversely affect the majority of these species.

5.1.7 LAND USE, RECREATION, SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

5.1.7.1 Onshore Project Facilities

Construction and operation of the onshore portion of the NESE Project would affect 358.2 acres of land and 59.6 acres of land, respectively. Of the area affected by construction, about 241.1 acres (67 percent) would be associated with pipeline right-of-way, ancillary facilities, and ATWS; 48.8 acres (14 percent) would be associated with Compressor Stations 200 and 206; 47.8 acres (13 percent) would be associated with contractor yards; and 20.5 acres (6 percent) would be associated with access roads. About 241.1 acres (67 percent) of land affected by construction would occur in Pennsylvania and 117.1 acres (33 percent) would occur in New Jersey. No onshore area of New York would be affected.

The Quarryville and Madison Loops would be collocated with Transco's existing Mainline pipeline system for 98 percent of their length. The workspace needed to construct the loops would overlap with Transco's current right-of-way, thereby reducing construction-related impacts. More specifically, the construction right-of-way overlap for the Quarryville Loop would be at least 35 feet for 91 percent of the pipeline length and the construction right-of-way overlap for the Madison Loop would be at least 20 feet for 74 percent of the pipeline length. Transco would install the 0.2-mile-long onshore segment of the Raritan Bay Loop using the HDD method, thereby avoiding overland construction in a commercial and residential area. To enhance public safety during operation, Transco would expand the width of its existing, permanent right-of-way by typically 25 feet to include the Quarryville and Madison Loops, and would retain a new, 20-foot-wide easement over the onshore HDD segment of the Raritan Bay Loop.

Construction and operation of the proposed modifications at Compressor Station 200 would occur entirely within the fenceline of the facility, whereas Compressor Station 206 would involve greenfield construction on a 52.1-acre parcel acquired by Transco. About 19.9 acres of the 52.1-acre parcel would be affected during construction and an additional 7.3 acres would be affected during construction of a new 3,300-foot-long access road to the facility. Operation of the facility, including the access road and inlet and outlet pipelines, would permanently impact 23.4 acres of land.

The Quarryville Loop would cross five farms that are implementing organic farming practices: three tracts are currently certified as official organic farms through the PCO organization and the USDA; the other two tracts are uncertified organic farms. Transco would implement the measures in its Agricultural Construction and Monitoring Plan, which includes vegetation maintenance activities designed specifically to meet the operational needs of and protect organic farming practices. Transco would also implement its Spill Plan to avoid and minimize the impact of hazardous material spills in these areas, and its Unanticipated Discovery of Contamination Plan if preexisting contaminated media is encountered. Transco would also work cooperatively with any landowners who request organic restoration methods, including the two farms identified that are implementing organic farming techniques and may be seeking organic certification. By implementing these plans and working with landowners, impacts on organic farming practices would be minimized.

Construction of the Quarryville Loop would impact about 123.9 acres of no-till farmland. The Quarryville Loop would be collocated with Transco's existing Mainline right-of-way for 97 percent of its length; therefore, the construction workspace on no-till farmlands would largely overlap with the existing right-of-way and the pipeline loop would be adjacent to operational right-of-way that is already located within no-till farmlands. Following construction, Transco would restore the temporary construction workspace and agricultural activities would be allowed to continue as before. For these reasons, impacts on no-till farmland would be temporary and minor and would resolve with the completion of construction in these areas.

Transco's proposed construction work area would be within 50 feet of 56 residences (houses, apartments, townhomes, etc.) and other buildings. Transco prepared site-specific RCPs to address impacts for residences within 50 feet of construction workspace. We reviewed these plans and find them acceptable. In the draft EIS we requested that home owners comment on these plans; however, no comments were received. We conclude that implementation of Transco's construction methods for working in proximity to residences and commercial facilities and site-specific RCPs would minimize disruption to residential and commercial areas to the extent practicable and facilitate restoration of these areas as soon as reasonably possible upon completion of construction. To further ensure that impacts on homeowners are minimized to the extent practicable, we are recommending that prior to construction, Transco develop and implement an environmental complaint resolution procedure describing the process that Transco would implement to resolve landowner concerns.

Construction and operation of the Project could potentially impact other planned development in the area. No planned projects are within 0.25 mile of the Quarryville Loop, four planned projects are within 0.25 mile of the Madison Loop, and two planned developments are within 0.25 mile of existing Compressor Station 200. No developments are planned within 0.25 mile of the Raritan Bay Loop or Compressor Station 206. The construction workspace associated with the Project would be located outside of the construction workspaces associated with the planned developments and the proposed loops would be collocated with Transco's Mainline system which already precludes the placement of structures over the permanently maintained right-of-way at these locations. However, indirect impacts such as noise from construction equipment and dust resulting from soil work would occur on a temporary basis. Transco would continue to coordinate with the developers and permitting authorities to identify any potential conflicts associated with the construction and operation of the Project, thereby limiting potential impacts on planned developments.

The Quarryville Loop would cross four recreational and special interest areas for a total of about 1.2 mile and an additional eight recreational and special interest areas would be within 0.25 mile of the onshore Project facilities. One of the primary concerns when crossing recreation and special interest areas is the impact of construction on the purpose for which the area was established (e.g., the recreational activities, public access, and resources the area aims to protect). Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also generate dust and noise, which could be a nuisance to recreational users. Construction could also interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails.

In general, impacts on onshore recreational and special interest areas would be temporary and limited to the period of active construction, which typically would last only several days to several weeks in any one area, with the exception of linear trails where a detour or temporary closure may be required. Transco has proposed general mitigation measures for recreation and special interest areas that would be affected by the Project (e.g., public notification protocols), and provided site-specific crossing plans completed in consultation with the applicable land management agency for other areas. Based on the impacts identified and the mitigation measures that Transco would implement, we conclude that the Project would not result in significant adverse impacts on onshore recreational or special interest areas.

Portions of the Project in New Jersey and New York would be located within a designated coastal zone. In New Jersey, the consistency of the Project with the CZMA would be determined by the NJDEP in conjunction with Transco's Waterfront Development permit application. On June 20, 2018, Transco resubmitted its CZMA consistency assessment and its Waterfront Development permit application to the

NJDEP. In New York, the New York City Department of City Planning would review the Project's consistency with the Coastal Management Program in conjunction with Transco's permit application. On June 27, 2017, Transco submitted its Joint Permit Application to the NYSDOS and New York City Department of City Planning, which included a coastal zone consistency assessment. Transco submitted subsequent updates to the NYSDOS and New York City Department of City Planning on September 18, 2017, July 2, 2018, and October 5, 2018. We are recommending that Transco file documentation of concurrence from the NJDEP, NYSDOS, and New York City Department of City Planning that the Project is consistent with the CZMA prior to construction of the Project.

Previously existing soil and groundwater contamination could be encountered during construction, particularly along the Madison Loop where Transco encountered contaminated groundwater during recent construction of the New York Bay Expansion Project. Transco developed an Unanticipated Discovery of Contamination Plan that describes how potential contaminants would be recognized during construction and specifies the steps that would be implemented to assess and respond to the contamination. Subsequent to issuance of the draft EIS, Transco also provided a Materials and Waste Management Plan that further details how contaminated media would be managed along the Madison Loop. We have reviewed the Unanticipated Discovery of Contamination Plan and Materials and Waste Management Plan and find that implementation of these plans would avoid or adequately minimize potential impacts associated with handling unanticipated, pre-existing, onshore contaminated media.

Visual resources along the proposed onshore pipeline loops are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. Temporary visual impacts from the Project would result from the construction and clearing of the pipeline right-of-way, ATWS, contractor yards, and Project access roads. Although stretches of upland forest are present along the proposed routes, 97 percent of the Quarryville Loop and 100 percent of the Madison Loop would be installed within or parallel to Transco's existing rights-of-way. The collocated pipeline would be consistent with the existing visual conditions in these areas and not contribute to additional significant visual impacts. After construction, all temporarily disturbed areas would be restored and returned to preconstruction conditions in compliance with federal, state, and local permits; landowner agreements; and Transco's easement requirements, except for aboveground facility sites, discussed below. To facilitate pipeline inspection, operation, and maintenance, the expanded, permanent right-of-way including the Quarryville and Madison Loops would be maintained in an herbaceous vegetated state. This maintained right-of-way would be mowed no more than once every 3 years in uplands, but a 10-foot-wide strip centered over the pipelines may be mowed annually.

In general, the impacts on visual resources resulting from the construction and operation of the MLVs and pig launchers/receivers would be minimal as each site is small and would be operated within the pipeline operational right-of-way, and/or within an existing facility. Proposed modification activities at existing Compressor Station 200 would occur within the property line at the already developed site; therefore, no permanent changes to the current visual landscape would occur. Visual simulations were completed for Compressor Station 206 for both summer (tree leaves on) and winter (tree leaves off) months and found that the forest buffer around the facility would effectively shield the facility from nearby viewpoints. Lighting would be present at the main gates, yards, and all building entry and exit doors, and would have directional control or be positioned in a downward position to minimize their visibility from local residences while maintaining OSHA standards for lighting. Therefore, we conclude that the aboveground facilities would not result in significant impacts on nearby visual receptors.

With adherence to Transco's proposed impact avoidance, minimization, and mitigation plans, and our recommendations, we conclude that overall impacts on land use, recreation and special interest areas, and visual resources would be adequately minimized.

5.1.7.2 Offshore Project Facilities

Construction of the Raritan Bay Loop would occur within a 14,165.5-acre workspace generally encompassing a 5,000-foot-wide area centered on the pipeline. The great majority of the workspace would be needed to accommodate the anchor spread around construction barges and would not actually be impacted by construction. Of the 14,165.5-acre designated workspace, an estimated 87.8 acres of seafloor would be directly impacted by construction (excavations, pipelay, anchoring systems, and backfilling) and 947.4 acres would be indirectly affected by the suspension and redeposition of at least 0.12 inch (0.3 centimeter) of sediments. Following construction, Transco would retain about 85.6 acres as permanent easement in offshore areas of New Jersey and New York and the remainder of the temporary construction workspace would be allowed to revert to previous uses.

The offshore portion of the Raritan Bay Loop would cross both New Jersey and New York state-owned submerged land. We conclude that construction of the Project would have temporary and minor impacts on various offshore recreational activities such as fishing, whale watching, and scuba diving. In addition, the Raritan Bay Loop would be approximately 0.1 mile from the Raritan Bay Waterfront Park and Old Bridge Waterfront Park; however, we conclude that construction of the Project would have temporary and minor impacts on recreational activities at these parks.

Impacts on commercial ship traffic during construction of the Raritan Bay Loop would be short term and mainly limited to a safety zone around the temporary workspace that would be used during offshore construction and commissioning of the pipeline. Vessels would be advised to avoid these safety zones. A Special Notice to Mariners would be submitted to the USCG to advise commercial vessels of the construction schedule and location of the restricted area, which would be marked by buoys and monitored by escort boats. These temporary restrictions are not expected to adversely affect commercial shipping because there is ample room in the surrounding area for ships to transit to and from local harbor destinations. Additionally, there would be constant communication between construction vessels and other boat traffic to ensure that adequate safety margins are maintained. Recreational boating that does occur in the area would be subject to the same restrictions imposed on commercial vessels as discussed above. Recreational boaters would have access to the same Special Notice to Mariners that would be available to fishermen and commercial ships. Therefore, no significant impacts on commercial or recreational boating are expected.

Transco initially identified 19 submerged historic and/or modern cable lines that would be crossed by the offshore portion of the Raritan Bay Loop, including 9 early 20th century telegraph cables, 9 submarine communication or electrical transmission cables, and the Neptune Cable (2 crossings), a 21st century electrical transmission cable. As discussed in section 4.9.1, Transco provided additional information to the NJHPO and New York SHPO documenting that historical cables are either absent from the workspace or are unlikely to be intact. The NJHPO and New York SHPO concurred and concluded that no additional action pertaining to historical cables is necessary, and we concur. Transco provided a draft Cable Crossing Plan for the two crossings of the Neptune Cable and we are recommending that, prior to construction of the offshore portion of the Raritan Bay Loop, Transco file the final Cable Crossing Plan for the Neptune Cable and documentation of its consultation with the cable owner regarding the plan.

Transco would obtain supplemental backfill material to complete burial of the Raritan Bay Loop and associated ancillary facilities from a vendor or vendors already permitted by the USACE and NJDEP to dredge material from the Ambrose Channel. In addition, Transco has submitted a preliminary application to the USACE for a permit under section 103 of the MPRSA to dispose of dredge material that would not cause significant undesirable effects, including through bioaccumulation, at the offshore HARS site. For dredge material that is approved for disposal at the HARS, Transco would conduct hydrodynamic sediment transport modeling to analyze sediment plume distribution in accordance with USACE and EPA testing guidance. Transco has proposed that dredge material that is not approved for beneficial use at the HARS be disposed of at one or two permitted onshore facilities in New Jersey. We are recommending that Transco file the final volume of dredge material for disposal at onshore and offshore locations; the final onshore and offshore dredge disposal sites; and agency comments for disposal sites.

Operation of the Raritan Bay Loop would have no significant impact on offshore commercial and recreational activity and would have no visual impact on the area as the entire facility would be installed below the seafloor at USACE-designated burial depths.

5.1.8 SOCIOECONOMICS

Construction of the NESE Project would not have a significant adverse impact on local populations, housing, employment, or the provision of community services. There would be temporary increases in demand for housing such as hotels, motels, and other rental units due to the influx of construction workers, and temporary increase in demand for local public services, such as police to direct traffic during construction, or to respond to emergencies associated with pipeline construction. Also, traffic levels would temporarily increase due to the commuting of the construction workforce to the Project area as well as the movement of construction vehicles and delivery of equipment and materials to the construction right-of-way.

We received comments regarding the potential effect of the Project on property values, particularly near Compressor Station 206. We assessed several available studies regarding property values and based on the research reviewed, we find no conclusive evidence indicating that natural gas pipeline easements or compressor stations have a significant negative impact on property values, although this is not to say that any one property may or may not experience an impact on property value for either the short or long term. Furthermore, Compressor Station 206 would be visually screened from surrounding properties and noise attributable to normal operations would be below human perception or meet our noise requirements at NSAs. Because visual and noise effects would diminish with distance from the compressor station, the facility would not be readily apparent to the great majority of homeowners in the area. We also note that many homeowners in the area reported that they currently experience noise, vibrations, and heavy truck traffic associated with the Trap Rock quarry.

Construction of the Project would benefit state and local economies by creating a short-term stimulus to the affected areas through payroll expenditures, local purchases of consumables and project-specific materials, and sales tax. The long-term socioeconomic effect of the Project during operation is also likely to be beneficial, based on the increase in tax revenues that would accrue in the affected communities and jurisdictions; however, these benefits would not be as significant as during construction. We received comments concerned that Compressor Station 206 would negatively impact local businesses and reputation. The nearest places of business to the proposed compressor building are about 0.5 mile to the east, along Route 27, and the majority of the intervening area is forested. Thus, the facility would be screened from view by mature forest and would meet our noise requirements at NSAs. Therefore, we conclude that the overall economic effects resulting from the Project would be beneficial at the state, local, and county levels in the form of increased sales and payroll taxes.

Based on the analysis presented, we conclude that the NESE Project would not have a significant adverse impact on the socioeconomic conditions of the Project area.

5.1.9 CULTURAL RESOURCES

Transco conducted archival research and field surveys to identify historic resources and locations for additional subsurface testing in areas with potential for pre-contact and historic archaeological sites. The NESE Project would not significantly impact cultural resources in the area, or adversely affect historic properties. Several comments were received expressing concern that several locations with NRHP-listed or other unique historic resources may be affected by proposed Compressor Station 206, resulting in direct or indirect impacts on the various properties. Transco's historic architecture survey determined that viewshed from the station to these historic properties is obstructed by topography, mature trees and dense vegetation, existing utility corridors, and other commercial infrastructure situated between the compressor station site and each historic property. Transco also indicated the nearest resource, i.e., the Washington Rochambeau Revolutionary Route, would be shielded from view by a forested buffer. Therefore, we conclude that Compressor Station 206 would not adversely affect these historic properties.

We, as well as Transco, consulted with 17 federally recognized Native American tribes to provide them an opportunity to comment on the Project. Additional information was provided to several tribes at their request.

Transco prepared plans to be used in the event any unanticipated archaeological sites or human remains are encountered during construction. The plans provide for work stoppage and the notification of interested parties, including Indian tribes, in the event of discovery. The PHMC, NJHPO, and New York SHPO reviewed these plans and found them acceptable. We concur.

Transco conducted additional soil borings in offshore New Jersey and New York waters in late 2018 to refine the volumes of dredge material for disposal. To ensure that our responsibilities under the NHPA and its implementing regulations are met, we are recommending that Transco not begin construction of the Raritan Bay Loop until it files the results for all supplemental soil borings, any evaluation reports and avoidance plans, and NJHPO and New York SHPO comments, and the ACHP is afforded the opportunity to comment if historic properties would be adversely affected.

5.1.10 AIR QUALITY

Project construction would result in temporary increases of air emissions from the use of diesel- and gas-fueled equipment and vessels, blowdown and purging activities, as well as temporary increases in fugitive dust emissions from earth/roadway surface disturbance. These impacts would be temporary and localized and would not be expected to cause or contribute to a violation of applicable air quality standards. However, to further minimize onshore construction emissions, Transco would implement measures such as applying dust suppressants on disturbed areas; covering open hauling trucks with tarps, as needed; limiting vehicle speeds on construction sites; and reducing engine emissions by use of low sulfur diesel, restricting engine idle times on site to 3 minutes, and requesting contractors to use construction equipment with engines meeting EPA Tier 4 non-road emission standards or best available emission reduction technologies. Transco could minimize offshore engine emissions by enforcing idling time limits when possible, utilizing clean diesel through add-on technologies; using newer equipment, where available; and requesting contractors utilize equipment meeting EPA Tier 3 or higher non-road emissions standard or best available emission reduction technologies.

The portion of the Project in the NJ-NY-CT Interstate AQCR (i.e., Madison Loop, Raritan Bay Loop, and Compressor Station 206) requires a federal General Conformity Determination because the combined direct and indirect emissions of NO_x during construction of these facilities would equal or exceed 100 tpy. We issued a draft General Conformity Determination on September 18, 2018 which opened a 30-day public comment period. The final General Conformity Determination (appendix I) was prepared with the cooperation of the EPA and addresses all comments that were received on the draft document. The final General Conformity Determination discloses the emissions that would occur under four construction scenarios that vary depending on the final decisions of the USACE, NJDEP, and NYSDEC regarding final volumes and disposal locations of dredge material. The estimated NO_x emissions associated with the four scenarios range from 679.7 to 721.8 tons in 2020, all of which exceed the General Conformity applicability threshold of 100 tpy NO_x. Transco has demonstrated that it could mitigate NO_x emissions for the worst-case scenario to ensure compliance with General Conformity regulations. However, Transco would be required to mitigate for the scenario that would occur during construction, in compliance with final determinations from the agencies. Transco has indicated that it intends to directly offset construction emissions by sponsoring mitigation offset projects in the Project area to demonstrate conformance. Should the direct mitigation option fall short of offsetting all Project construction NO_x emissions in the NJ-NY-CT Interstate AQCR, Transco would purchase ERCs or CERs to offset the remaining NO_x emissions. As detailed in the final General Conformity Determination, we have determined that the NESE Project would achieve conformance with the New York and New Jersey SIPs with respect to the NJ-NY-CT Interstate AQCR through compliance with the requirements of 40 CFR 93.158(a)(2) and 40 CFR 93.158(c). However, because the final dredge disposal volumes and disposal locations are pending agency approval, we recommend that, prior to construction, Transco file its final plans for disposing of dredge material, final construction emission estimates, plans for tracking and reporting actual emissions, and plans for offsetting the actual construction emissions.

Compressor Station 206 would be the only source of permitted, long-term emissions for the Project. Many commenters expressed concern that the operating air emissions from Compressor Station 206 could adversely impact the health of individuals in the area and recommended that we conduct a health impact assessment for the facility. Under the CAA, the EPA established the NAAQS to protect human health and public welfare. These standards incorporate short-term (hourly or daily) levels and long-term (annual) levels to address acute and chronic exposures to the pollutants, as appropriate. The NAAQS include primary standards that are designed to protect human health, including the health of sensitive individuals such as children, the elderly, and those with chronic respiratory problems. New Jersey has adopted the NAAQS but has additional ambient air quality standards, including an annual and 24-hour standard for total suspended particulates and a 1-hour ozone standard. HAPs, also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects. There are no national air quality standards for HAPs, but their emissions are limited through permit thresholds and technology standards. New Jersey maintains regulations limiting emissions of HAPs.

New Jersey also requires that new or modified air emissions equipment or control devices incorporate SOTA control technology where NAAQS criteria pollutants and HAPs emissions exceed thresholds identified in the state code. The turbines at Compressor Station 206 would meet SOTA requirements through the use of $SoLoNO_x$ and SCR technology. These control technologies ensure that NO_x and CO emissions meet performance levels required by SOTA regulations.

Transco provided a detailed emissions analysis for Compressor Station 206, including normal operating conditions and blowdown events. The emissions analysis determined that Compressor Station 206 would be a minor source of air emissions under the CAA Title V Operating Permit program and would likely be required to report GHGs under the Mandatory Reporting Rule. Methane is the primary pollutant emitted during a blowdown, but other natural gas constituents, including ethane, propane, butane, pentane, and hexane, are also emitted. Blowdown emissions were included in overall station emissions as GHG and VOCs.

Transco also conducted modeling in accordance with EPA and NJDEP guidelines, and the results indicate that Compressor Station 206 would meet the NAAQS. Transco performed an ambient air quality modeling analysis to determine local impacts from Compressor Station 206 using the EPA's AERMOD dispersion model (Version 16216) in screening mode, which indicated that the maximum modeling concentrations of criteria pollutants would not contribute to an exceedance of the NAAQS.

In summary, Transco would employ air pollution control measures to reduce NO_x, CO, and HAP emissions. At full-capacity upper bound (i.e. the stations full potential to emit), emissions from the station would meet the NAAQS. The station would also be a minor source of HAPs and other emissions under federal air permitting programs (i.e., NSR, Title V, and NESHAPs). Transco would be required to obtain an air quality permit for Compressor Station 206 from the NJDEP and has committed to comply with all applicable permit requirements, including monitoring and reporting requirements.

Given adherence to Transco's proposed measures as well as our additional recommendations, and compliance with state and federal air permit conditions, we conclude that potential air impacts associated with the Project would be adequately minimized and that a health impact assessment for a facility of the size and impact of Compressor Station 206 is not warranted.

5.1.11 NOISE

Noise would be generated during construction and operation of the proposed facilities. Construction activities in any one area would typically last from several days to several weeks on an intermittent basis. Construction equipment would be operated on an as-needed basis and limited primarily to daytime hours (7:00 a.m. to 7:00 p.m.) with the exception of some discrete construction related activities (e.g., hydrostatic testing, tie-ins, purge and packing the pipeline, and select HDD work). Generally, nighttime noise is expected to increase only in localized areas near 24-hour HDD activities. HDD operations would be relatively short-term (1 to 3 months) and Transco would implement measures at the HDD sites where the noise level could potentially exceed FERC requirements, including installation of noise barriers or a noise-reducing tent. With implementation of the proposed mitigation measures, we conclude that the estimated noise from HDD operations would not result in a significant impact on nearby NSAs. To ensure that the actual noise from HDD activities where mitigation is required is consistent with our estimates, we are recommending that Transco file in its weekly construction reports the noise measurements from the nearest NSAs, obtained at the start of drilling operations; the noise mitigation that Transco implemented at the start of drilling operations; and any additional mitigation measures that Transco would implement if the initial noise measurements exceeded an L_{dn} of 55 dBA at the nearest NSA and/or increased noise is greater than 10 dBA over ambient conditions.

The primary sources of noise from offshore construction would be marine vessels, such as tugs and barges, dredging activities, pile-driving, and HDD operations. To minimize impacts on offshore resources, construction would occur 24 hours per day, 7 days per week until complete. Most offshore construction would occur more than 1 mile from the shoreline and within the Raritan Bay waters; therefore, impacts on NSAs would not be significant. Potential impacts of noise on offshore wildlife are discussed summarized in sections 5.1.5.2 and 5.1.5.3.

Ambient noise surveys and noise modeling indicate that the normal operating noise associated with Compressor Stations 200 and 206 would be below the FERC guideline at nearby NSAs. However, to ensure that operating noise levels are consistent with the modeling estimates, we are recommending that Transco file a noise survey no later than 60 days after placing the Project facilities in service and to take additional measures, if necessary, to confirm compliance with the 55 dBA L_{dn} requirement at nearby NSAs. Noise would also occur during venting (blowdown) of natural gas for annual emergency shut-down system testing and during certain maintenance activities that would typically occur several times per year. Venting could also occur in the unlikely event of an emergency at the compressor station. Notice would be provided to landowners and local officials at least one week in advance of planned blowdowns. Transco would install silencers on the blowdown vents to reduce the associated noise to 60 dBA at a distance of 300 feet during planned blowdowns, although the blowdown associated with required annual testing may not be silenced. Although certain blowdown events may be audible in proximity to the compressor station, the noise would be periodic and short-term, and would diminish with distance from the station, and in nearly all cases, area landowners would have advanced notice of the event.

We received numerous comments expressing concern for the operational noise associated with Compressor Station 206, including at the NJBVMC. The estimated noise associated with Compressor Station 206 would range from 0.4 dBA to 0.7 dBA at the nearest NSAs, which is below the threshold of perception for the human ear (3 dBA). Ambient noise was measured at the Samadhi Buddha statue at the NJBVMC and was combined with the estimated station noise to determine overall impacts. The noise increase above the existing ambient noise near the Samadhi Buddha statue would be 0.4 dBA. Commenters were also concerned about noise impacts on the meditation trail that is proposed for construction at the NJBVMC in 2019. The estimated operational noise at the nearest point on the meditation trail to the compressor building (about 1,225 feet away) would be 46.8 dBA L_{dn}, which would comply with our operating noise requirements at NSAs of 55 dBA L_{dn}.

Given adherence to Transco's proposed measures as well as our additional recommendations, we conclude that construction and operation of the Project would not result in significant noise-related impacts at nearby NSAs.

5.1.12 RELIABILITY AND SAFETY

The pipeline and aboveground facilities associated with the NESE Project would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the facilities have adequate strength to transport the natural gas safely.

We received comments indicating that the State of New Jersey maintains more strict Class location standards for intrastate pipelines than the federal standards described above. The Class location for the proposed pipeline segments vary. In many cases Transco would design and maintain the proposed pipeline loops to exceed the minimum federal safety design standards. If a subsequent increase in population density adjacent to the right-of-way results in a change in Class location for the pipeline, Transco would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required, to comply with DOT requirements for the new class location.

We received numerous comments from landowners regarding the potential for blasting at the Trap Rock quarry to damage Compressor Station 206, resulting in a serious public safety incident. Mining has occurred since the mid-1850s and is expected to continue until approximately 2045. The nearest face of the quarry to the planned compressor building is 2,100 feet away and, based on the Franklin Township zoning map, the quarry is not expected to expand toward the compressor station site. To assess the potential for blasting-related vibrations to damage Compressor Station 206, Transco monitored and analyzed vibrations at the compressor station site during blasting at the quarry, and conducted a geotechnical investigation of the compressor station site.

The compressor units would operate on bearings that are designed to meet equipment vibration specifications. Normal vibration associated with operation of the compressor station, coupled with the periodic displacements from blasting as determined by the site-specific monitoring, would not exceed the vibration limits on the unit bearings. For added safety, each compressor unit would include 16 vibration monitors, and the vibration monitoring system would initiate a shut-down of the compressor unit if vibrations were detected in excess of unit bearing limits. Transco also committed to incorporate additional safety factors in the final foundation designs to accommodate the potential for blasting-induced vibration to increase over time. We conclude that Compressor Station 206 would be adequately protected from blasting activities at the Trap Rock quarry, but to verify that the design accounts for potential increases in future blast intensity, we are recommending that Transco file the final foundation designs.

We also received comments that blasting at the Trap Rock quarry or operation of Compressor Station 206 could cause Transco's Mainline pipelines in the area to fail, creating a public safety incident. Other than connecting Compressor Station 206 to Transco's existing Mainline pipeline system, Transco is not proposing to modify the Mainline system near the compressor station, and the Mainline system's current MAOP of 800 pounds per square inch would remain unchanged upstream and downstream of the new station. Therefore, public safety concerns regarding the existing Mainline system near Compressor Station 206 are outside the scope of our review for the NESE Project. However, Transco's existing Mainline A and Mainline C pipelines were constructed in 1950 and 1969, respectively, and were relocated and replaced in 1987 to accommodate an expansion of the quarry. The pipelines are now about 0.4 mile from the nearest quarry face and Transco stated that there have been no operational issues on their system attributable to the Trap Rock quarry. In addition, Transco's existing Mainlines are located in relatively low population Class 1 and Class 2 areas near the quarry, but are constructed and operated in accordance with more stringent Class 3 standards for added safety. The suction and discharge pipelines that would connect Compressor Station 206 to the Mainline system would also be constructed and operated in accordance with Class 3 standards and would not be within a High Consequence Area.

Transco stated that, in the event of a natural gas fire at the compressor station, the automated emergency shutdown system would provide the most effective way to begin to address an emergency. In addition, Transco would be required to design, construct, operate, and maintain to meet the DOT's safety regulations. Further, as required by the DOT, Transco would establish and emergency plan for the proposed Project. Transco's operations staff would also meet with local emergency planning committees to review site-specific emergency response plans and Project mapping, and facility-specific training would be provided to local emergency personnel to inform them of response procedures at Project sites.

Commenters also expressed concern that operation of Compressor Station 206 would increase the velocity of gas in the existing pipelines in the area, leading to increased corrosion. As indicated above, Transco's facilities are designed, constructed, and operated in accordance with DOT's regulations which specifically address pipeline corrosion. In addition, an increase in gas velocity would not be expected to increase corrosion as dry, flowing, tariff quality gas reduces the potential for liquid water to occur. Transco's system is optimized to minimize stagnant areas where lack of gas flow could allow entrained moisture to precipitate from the gas stream and collect as a liquid, resulting in a potentially corrosive environment. Transco also employs technology to address and mitigate the risk of corrosion, including moisture monitoring equipment, corrosion inhibiting chemical injection systems, dehydration systems, and liquid management systems, where necessary. As required by regulation, Transco also utilizes in-line inspection tools to identify anomalies, such as metal loss caused by corrosion, and would take action to ensure pipeline integrity.

In summary, we conclude that Transco's compliance with applicable design, construction and maintenance standards and DOT safety regulations would be protective of public safety.

5.1.13 CUMULATIVE IMPACTS

The NESE Project would occur in an area that has been substantially altered by human activity, ranging from predominantly agricultural land use along the Quarryville Loop to commercial, residential, and industrial development along the Madison Loop and near Compressor Stations 200 and 206. The Raritan Bay Loop would also cross the entry into one of the most active ports in the world. This area experiences high levels of commercial ship traffic and periodic maintenance dredging activity, and sediments in the area contain metals, PCBs, and other contaminants from anthropogenic sources. The existing environmental conditions resulting from past human activity in the Project area are described on a resource-by-resource basis in section 4.0.

Within the existing environment, the NESE Project and other current and reasonably foreseeable future projects in the area could result in varying degrees of cumulative impact on different resources depending on the type and scope of each project, their proximity to each other (the geographic scope), the timeframe in which they are constructed (the temporal extent), and the measures that would be implemented to avoid or reduce impacts at each project site.

We identified 48 other projects that could potentially cause a cumulative impact when added to the effects of the proposed Project including: non-jurisdictional facilities associated with the Project; energy projects (including FERC-jurisdictional projects); transportation projects; commercial and industrial projects; beach and shoreline rehabilitation projects; and dredging projects. We considered as part of our cumulative review potential cumulative impacts on geology and soils; groundwater, surface water (onshore and offshore), and wetlands; vegetation; wildlife; fisheries and aquatic resources; land use, special interest areas, and visual resources; socioeconomics; cultural resources; air quality (including climate change); and noise.

As described in section 4.0, we found that most impacts associated with the NESE Project would be temporary to short-term in duration and localized to the construction workspace or adjacent areas. Long-term impacts would occur where temporary workspaces would be cleared of forest and permanent impacts would occur where new permanent access roads and new aboveground facilities are constructed and where the operating rights-of-way of the onshore pipeline loops are maintained in an herbaceous condition. The combustion of pipeline quality natural gas at Compressor Station 206 would result in air emissions throughout the operating life of the facility, but emissions would comply with applicable regulations that are protective of human health. These long-term and permanent impacts would also be limited based on the large extent of existing resources in the Project area relative to the footprint of the NESE Project, implementation of Project-specific construction and restoration plans that minimize impacts, and compliance with our recommendations and applicable permit conditions.

Most cumulative impacts between the NESE Project and other past, present and reasonably foreseeable future projects would also be temporary and minor. Temporary cumulative impacts could result from the release of sediment-bound contaminants during offshore construction activities. In addition, residents near Compressor Station 200 and along the Madison Loop could experience temporary cumulative impacts from construction emissions, dust, and noise if project construction schedules overlap. Short-term cumulative benefits could also be realized through increased government revenues from the Project and other actions.

Emissions from construction and operation of the Project and the downstream use of the Project-related natural gas would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to future climate change impacts. Because we cannot determine the incremental physical impacts on the environment caused by climate change, we cannot determine whether the NESE Projects' contribution to cumulative impacts on climate change would be significant.

5.1.14 ALTERNATIVES

As an alternative to the proposed action, we evaluated the No Action Alternative, system alternatives, offshore route alternatives, Compressor Station 206 site and access road alternatives, an EMD compression alternative at Compressor Station 206, and offshore trenching method alternatives. To recommend an alternative over Transco's proposal, an alternative must: meet the stated purpose of the Project to deliver 400,000 Dth/d of incremental natural gas capacity to National Grid at the Rockaway Transfer Point; be technically and economically feasible and practical; and provide a significant environmental advantage over the proposal.

While the No Action Alternative would eliminate the short- and long-term environmental impacts identified in this EIS, the stated purpose of the Project would not be met, likely causing National Grid to seek other sources of natural gas to meet their forecasted need for additional supply. Because this alternative would not be able to meet the purpose of the NESE Project, we conclude it is not preferable to the proposed action. We also conclude that alternative energy sources and energy conservation and efficiency programs are not within the scope of this analysis because the purpose of the NESE Project is to transport natural gas to the Rockaway Transfer Point.

Other existing natural gas transmission systems in the Project area either lack available capacity to meet the purpose of the Project or modifications to extend these systems to the Rockaway Transfer Point would not provide a significant environmental advantage when compared to the Project. In addition, due to the extensive planning, permitting, public outreach, and special construction methods that would be required, the expansion of any other system would result in an unreasonable delay to the requested in-service date of the NESE Project.

We also considered whether alternative modifications to Transco's system could meet the Project purpose and significantly reduce environmental impacts. We evaluated various combinations of looping and compression, including some that would eliminate the need for Compressor Station 206, and conclude that the Transco system alternatives would be either hydraulically infeasible, impractical, or would not provide a significant environmental advantage over Transco's proposal when balancing the various impacts between the alternatives.

We evaluated six pipeline route alternatives for the Raritan Bay Loop. Transco consulted with the USACE, NJDEP, NYSDEC, and other agencies in developing the proposed route for the Raritan Bay Loop. One of the route alternatives was suggested by the NMFS and would reduce the length of the offshore pipeline by increasing the length of the onshore pipeline, and a second alternative was suggested by the NYSDEC to potentially reduce impacts on hard clam habitat in New York State waters. The primary assumptions that we considered in our review were that the alternatives must begin at the onshore termination of the Madison Loop and end at the offshore Rockaway Transfer Point, and that the alternatives must be constructed to meet the USACE marine navigational safety and pipeline burial depth requirements. We compared various factors including (but not limited to) total length; trenching impacts and the volume of sediment disturbance; impacts on shellfish, hard clam, and surf clam habitat; the number of residences and businesses in proximity to construction; collocation with existing rights-of-way; construction constraints; reliability and safety; and economic practicality. Based on our evaluations, we conclude that none of the route alternatives would offer a significant environmental advantage when compared to the proposed route and that some alternatives would pose substantial safety, reliability, or constructability constraints relative to Transco's proposal.

Because the Quarryville Loop and Madison Loop would be collocated with Transco's existing Mainline system for 97 percent and 100 percent of their lengths, respectively, we did not consider any route alternatives for the onshore loops as any deviation from the existing right-of-way would lengthen the pipeline, affect new areas and landowners not currently impacted by the existing facilities, and affect more area during construction and operation than would the proposed looping.

We evaluated 39 alternative locations for Compressor Station 206. Thirty-four of the 39 compressor station site alternatives were eliminated from further consideration due to site availability, parcel size and configuration, and/or the presence of wetlands and wetland buffers. The four remaining alternatives and Transco's proposed site were evaluated in more detail including the length of the associated access road and connecting pipelines; construction and operation land requirements; construction and operation impacts on upland forest and wetlands; and proximity to residences, schools, and places of worship, which many commenters noted as a concern. Compared to the alternatives, the compressor building at Transco's proposed site would be 920 feet further from the nearest residence, and 8 homes would be within 0.5 mile of the proposed facility as compared to over 100 to 200 homes for the alternatives. The proposed site would also be located nearly twice as far from the nearest school or day care center and would be about 0.5 mile from the nearest place of worship. In balancing the advantages and disadvantages of the alternatives, we conclude that none offer a significant environmental advantage over the proposed site. We also evaluated the potential to utilize an existing road used by the EPA in remediating the Higgins Farm Superfund site to access the Compressor Station 206 site and conclude that modifying and extending the existing road would not present a significant environmental advantage over Transco's proposed access road to the site.

We considered the feasibility of using EMD compressors as an alternative to the natural gas-driven compressors proposed for Compressor Station 206. The EMD Compression Alternative would reduce noise and local air emissions during operation but would require the construction of 3.9 miles of electric transmission power line and result in greater regional air emissions due to the mix of primary energy source used to generate electricity in the region. Therefore, we conclude that the EMD Compression Alternative does not offer a significant environmental advantage over Transco's proposed use of natural gas at Compressor Station 206.

Finally, we considered the use of various construction methods for the trench installation of the Raritan Bay Loop in the offshore environment. The alternatives must be able to meet safe burial depths and avoid creating a marine navigation hazard as required by the USACE. We compared a number of environmental and constructability factors and conclude that none of the alternatives would offer a significant environmental advantage over Transco's proposed use of the jet trencher, and that some alternatives may be unavailable, would have limited application, or be unable to obtain appropriate burial depth.

In summary, we have determined that Transco's proposed Project, as modified by our recommended mitigation measures, is the preferred alternative than can meet the Project objectives.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the NESE Project, we recommend that the following measures be included as specific conditions in the Commission's Order. We conclude that these measures would further mitigate the environmental impact associated with construction and operation of the NESE Project.

1. Transco shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. Transco must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of OEP **before using that modification**.

2. The Director of OEP, or the Director's designee, has delegated authority to address any requests for approvals or authorizations necessary to carry out the conditions of the Order, and take whatever

steps are necessary to ensure the protection of environmental resources during construction and operation of the Project. This authority shall allow:

a. the modification of conditions of the Order;

b. stop-work authority; and

c. the imposition of any additional measures deemed necessary to ensure continued compliance with the intent of the environmental conditions of the Order as well as the avoidance or mitigation of unforeseen adverse environmental impact resulting from Project construction and operation.

3. **Prior to any construction**, Transco shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EIS, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Transco shall file with the Secretary any revised detailed survey alignment sheets/maps at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment sheets/maps.

   Transco's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Transco's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Transco shall file with the Secretary detailed alignment sheets/maps and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan* and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

b. implementation of endangered, threatened, or special concern species mitigation measures;

c. recommendations by state regulatory authorities; and

d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the authorization and before construction begins**, Transco shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Transco must file revisions to the plan as schedules change. The plan shall identify:

a. how Transco will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EIS, and required by the Order;

b. how Transco will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

c. the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;

e. the location and dates of the environmental compliance training and instructions Transco will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);

f. the company personnel (if known) and specific portion of Transco's organization having responsibility for compliance;

g. the procedures (including use of contract penalties) Transco will follow if noncompliance occurs; and

h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

i. the completion of all required surveys and reports;
ii. the environmental compliance training of onsite personnel;
iii. the start of construction; and
iv. the start and completion of restoration.

7. Transco shall employ at least one EI per construction spread. The EI shall be:

a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

d. a full-time position, separate from all other activity inspectors;

e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and

f. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Transco shall file updated status reports with the Secretary on a **weekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

   a. an update on Transco's efforts to obtain the necessary federal authorizations;

   b. the construction status of each spread, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally-sensitive areas;

   c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

   d. a description of the corrective actions implemented in response to all instances of noncompliance;

   e. the effectiveness of all corrective actions implemented;

   f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

   g. copies of any correspondence received by Transco from other federal, state, or local permitting agencies concerning instances of noncompliance, and Transco's response.

9. Transco shall develop and implement an environmental complaint resolution procedure, and file such procedure with the Secretary, for review and approval by the Director of OEP. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. **Prior to construction**, Transco shall mail the complaint procedures to each landowner whose property would be crossed by the Project.

   a. In its letter to affected landowners, Transco shall:

   - i. provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
   - ii. instruct the landowners that if they are not satisfied with the response, they should call Transco's Hotline; the letter should indicate how soon to expect a response; and
   - iii. instruct the landowners that if they are still not satisfied with the response from Transco's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. In addition, Transco shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:

   - i. the identity of the caller and date of the call;
   - ii. the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;
   - iii. a description of the problem/concern; and
   - iv. an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

10. Transco must receive written authorization from the Director of OEP **before commencing construction of any Project facilities**. To obtain such authorization, Transco must file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. Transco must receive written authorization from the Director of OEP **before placing the Project into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.

12. **Within 30 days of placing the authorized facilities in service**, Transco shall file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or

    b. identifying which of the conditions in the Order Transco has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction**, Transco shall file with the Secretary a final table identifying all water supply wells and springs, field-verified, within the construction workspaces of the NESE Project, and all other water supply wells and springs within 150 feet of the Project workspaces. The table shall provide the location of each well and spring by milepost, and the distance and direction of each well and spring from the construction workspace. Transco shall also describe the measures that it

will implement to protect any wells or springs within construction workspaces from physical damage, for review and written approval of the Director of OEP. *(Section 4.3.1.8)*

14. **Prior to construction of the Raritan Bay Loop**, Transco shall file with the Secretary documentation of consultation with the NYSDEC, NJDEP, and NMFS regarding its final proposed mitigation for fisheries and aquatic resources, including timing restriction commitments and allowable work within these periods. *(Section 4.5.2.8)*

15. **Prior to construction of the Raritan Bay Loop**, Transco shall file with the Secretary a 5-year post-construction benthic sampling and monitoring plan, prepared in consultation with the NMFS, for review and written approval of the Director of OEP. The plan shall identify the timing of sampling surveys, success criteria for assessing recovery of benthic species, and reporting requirements. *(Section 4.5.2.8)*

16. **Prior to construction of the Raritan Bay Loop**, Transco shall file with the Secretary the final volume of dredge material for disposal at onshore and offshore locations; the final onshore and offshore dredge disposal sites; and agency comments for disposal sites. *(Section 4.5.2.8)*

17. **Prior to construction of the Raritan Bay Loop**, Transco shall file with the Secretary, for review and written approval of the Director of OEP, its final acoustic analysis regarding marine species and a copy of the IHA request submitted to the NMFS. *(Section 4.5.2.8)*

18. **Prior to construction of the Raritan Bay Loop**, Transco shall file with the Secretary, for review and written approval of the Director of OEP, a pile driving noise monitoring and mitigation plan. The plan shall include:

    a. a description of the equipment and methods Transco will use to measure noise during pile installation and removal;

    b. a typical figure depicting where the measurement equipment would be placed relative to the piles;

    c. provisions for reporting noise to the FERC and the NMFS;

    d. mitigation measures that Transco will implement to reduce noise to acceptable levels if the noise exceeds predicted levels; and

    e. comments on the plan from the NMFS. *(Section 4.5.2.8)*

19. Transco shall **not begin construction** activities **until**:

    a. FERC staff completes conference with the FWS regarding the eastern black rail, if required; and

    b. Transco has received written notification from the Director of OEP that construction or use of mitigation may begin. *(Section 4.6.3.2)*

20. Transco shall **not begin construction** activities **until**:

    a. FERC staff receives comments from the NMFS regarding the proposed action;

    b. FERC staff completes formal ESA consultation with the NMFS, if required; and

c. Transco has received written notification from the Director of OEP that construction or use of mitigation may begin. *(Section 4.6.3.6)*

21. **Prior to construction**, Transco shall file with the Secretary documentation of concurrence from the NJDEP, NYSDOS, and New York City Department of City Planning that the Project is consistent with the CZMA. *(Sections 4.7.6.1 and 4.7.6.2)*

22. **Prior to construction of the offshore portion of the Raritan Bay Loop**, Transco shall file with the Secretary, for review and written approval of the Director of OEP, the final Cable Crossing Plan for the Neptune Cable and documentation of Transco's consultation with the cable owner regarding the plan. *(Section 4.7.7.2)*

23. Transco shall **not begin construction** of the Raritan Bay Loop and/or use of associated temporary work areas **until**:

    a. Transco files with the Secretary the results from all supplemental geotechnical soil borings along the Raritan Bay Loop, any necessary cultural resource evaluation reports and avoidance plans, and the NJHPO and New York SHPO comments;

    b. the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and

    c. the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans, and notifies Transco in writing that construction may proceed on the Raritan Bay Loop.

    All materials filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "**CUI//PRIV - DO NOT RELEASE**." *(Section 4.9.4)*

24. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP:

    a. a final CETP, AQMP, and MPETP that specifically addresses the final General Conformity emissions scenario;

    b. a final CETP and AQMP that include emissions associated with the vibratory/diesel pile driving hammers and any other emission sources that may ultimately be used onsite during construction that are not currently anticipated;

    c. revised tables in attachment A of the CETP to include the EPA engine tier rating for marine vessels and construction equipment; and

    d. a final MPETP that includes specific details regarding the data to be collected for each vehicle/engine replacement using guidelines and resources from EPA's Clean Diesel Grant Program. *(Appendix I)*

25. Transco shall provide its CETP and reports and MPETP and reports directly to contacts at the EPA, NYSDEC, and NJDEP **on a monthly basis during construction**. *(Appendix I)*

26. **Prior to construction**, Transco shall file with the Secretary documentation confirming that Transco's mitigation projects are in place and/or that it has purchased ERCs and CERs to offset all estimated construction emissions of NO_x within the NJ-NY-CT Interstate AQCR. *(Appendix I)*

27. Transco shall file in the **weekly construction status reports** the following information for HDD sites requiring noise mitigation:

    a. the noise measurements from the nearest NSAs, obtained at the start of drilling operations;

    b. the noise mitigation that Transco implemented at the start of drilling operations; and

    c. any additional mitigation measures that Transco will implement, for review and written approval by the Director of OEP, if the initial noise measurements exceeded an L_{dn} of 55 dBA at the nearest NSA and/or increased noise is greater than 10 dBA over ambient conditions. *(Section 4.10.2.2)*

28. Transco shall file a noise survey with the Secretary **no later than 60 days** after placing the new equipment at existing Compressor Station 200 in service. If a full load condition noise survey is not possible, Transco shall instead file an interim survey at the maximum possible horsepower load and file the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the modified Compressor Station 200 under interim or full horsepower load exceeds 55 dBA L_{dn} at any nearby NSA, Transco shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Transco shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.10.2.2)*

29. Transco shall file a noise survey with the Secretary **no later than 60 days** after placing Compressor Station 206 in service. If a full load condition noise survey is not possible, Transco shall instead file an interim survey at the maximum possible horsepower load and file the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the station under interim or full horsepower load exceeds 55 dBA L_{dn} at any nearby NSA, Transco shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Transco shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.10.2.2)*

30. **Prior to construction**, Transco shall file with the Secretary, stamped and sealed by the professional engineer-of-record in New Jersey, the final foundation designs that incorporate safety factors to prevent displacement if future blast intensity increases at the Trap Rock Quarry. *(Section 4.11.4)*

APPENDIX A

DISTRIBUTION LIST
FOR THE NOTICE OF AVAILABILITY OF THE
FINAL ENVIRONMENTAL IMPACT STATEMENT

Appendix A

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Jeff Kaelin, New Jersey-At-Large Member
John McMurray, New York Appointed Obligatory Member
Laurie Nolan, New York Appointed At-Large Member
Richard Robins, Council Chairman

Maryland

Atlantic States Marine Fisheries Commission

Loren Lustig, Governor's Appointee

New Jersey

Phil Murphy, Governor

Atlantic States Marine Fisheries Commission

David Chanda, NJ Administrator
Robert Andrzejczak, Assemblyman Sqt.
Thomas Fote, Governor's Appointee

Delaware River Basin Commission

Steve Tambini, Executive Director

Department of Agriculture
- Freehold Soil Conservation District
  - Stacy Brady

Department of Environmental Protection
- Bureau of Emergency Response
- Bureau of Urban Growth and Redevelopment
  - Christopher Jones
- Division of Fish and Wildlife, Marine Fisheries Council
  - Charlie Bergmann
- Historic Preservation Office
  - Jesse West-Rosenthal
  - Katherine Marcopul, Acting Administrator and Deputy SHPO
- Megan Kelly
- Office of Permit Coordination
  - Megan Brunatti, Environmental Specialist
- Office of Permit Coordination and Environmental Review
  - Ruth W. Foster, Acting Director

Department of the Treasury
- Board of Public Utilities
  - Rick Mroz, President

Department of Transportation
- Office of Maritime Resources
  - Genevieve Boehm-Clifton

Division of Parks and Forestry
- Liberty State Park

<u>New York</u>

Andrew Cuomo, Governor

Atlantic States Marine Fisheries Commission
- Emerson Hasbrouck, Jr., Governor's Appointee
- James Gilmore, Jr., Vice Chair and NY Administrator
- Philip Boyle, Senator

Department of Environmental Conservation
- Air Resources, Climate Change and Energy
  - Jared Snyder, Deputy Commissioner for Air and Climate
- Charles DeQuillfeldt, Biologist 2
- Commissioner's Office
  - Basil Seggos, Commissioner
- Dawn McReynolds, Section Head Marine Habitat
- Diane English, Permit Administrator
- Division of Environmental Permits
  - Chris Hogan, Section Chief
- Karen Gaidasz
- Karen Woodfield, Environmental Engineer
- Katie Axt, Program Manager: Dredge Team Leader
- New York Natural Heritage Program
  - Andrea Chaloux, Environmental Review Specialist
- Steve Zahn, NYC Assistant Regional Director

Department of Law
- Office of the Attorney General
  - Brian Mahanna, Chief of Staff

Department of Parks, Recreation, and Historic Preservation
- Larry Migliozzi, Administrator
- Paul Laudato, General Counsel
- Ronald Rausch, Director, Environmental Management
- State Historic Preservation Office
  - Daria Merwin
  - Philip Perazio, Archaeologist and Project Reviewer
  - Ruth Pierpont, Deputy Commissioner of Historic Preservation / Deputy State Historic Preservation Officer

Department of Public Service
- Kathleen Burgess, Secretary, Commission

Department of State
- Office of Planning and Development
  - Stephen Ridler
- Office of Planning and Development, Coastal Management Program, Consistency Review Unit
  - Matt Maraglio, Coastal Resources Specialist
  - Rosa Mendez, Coastal Resources Specialist
- Rossana Rosado, Secretary

Department of Transportation
- Matthew Driscoll, Commissioner
- Naim Rasheed
- Region 11
  - Sonia Pichardo, NYC Regional Director

Governor's Office
- Venetia Lannon, Deputy Secretary for Environment

Governor's Office of Storm Recovery
- Alex Zablocki, Senior Program Manager
- Tom King, Public Service Attorney

Interstate Environmental Commission
- Judith Baron, Commissioner, Vice Chair
- Rose Trentman, Commissioner

Office of General Services
- Bethany Wieczorek, Land Management
- Bradley Allen, Deputy Commissioner and Counsel
- John Carstens, Land Management
- Ralph Hill
- Richard Scott

Port Authority of New York and New Jersey
- Bernice Malione, Assistant Director of Environmental Compliance
- Maritime Association
- Paul Higgins, Policy Advisor to the Vice-Chairman
- William Nurthen

Pennsylvania

Tom Wolf, Governor

Atlantic States Marine Fisheries Commission
John Arway

Department of Conservation and Natural Resources
Bureau of Forestry, Natural Heritage Section
Greg Podniesinski, Section Chief
Katie Woodbury, Secretary's Office

Department of Environmental Protection
Hydraulic Dam Safety, Waterways and Wetlands Section
Edward J. Muzic, Civil Engineer Manager
Regional Permit Coordination Office
South-Central Regional Office
Joseph Adams, Regional Director
Scott Williamson
Southeast Regional Office
Dominic Rocco, Program Manager

Fish and Boat Commission
Andrew Shiels, Director

Game Commission
Bureau of Wildlife Habitat Management, Division of Environmental Planning and Habitat Protection
Nathan Havens
John Taucher

Historical and Museum Commission
State Historic Preservation Office
Douglas McLearen
State Historic Preservation Office, Division of Archaeology and Protection
Andrea MacDonald, Acting Bureau Director / Deputy SHPO

Natural Gas Taskforce

Public Utility Commission
Andrew Place, Commissioner
Gladys Brown, Chair
John Coleman, Vice Chair
Pamela Witmer, Commissioner
Robert Powelson, Commissioner

Susquehanna River Basin Commission
Eric Roof, Manager - Compliance and Enforcement
Gwyn Rowland, Manager - Governmental and Public Affairs
James Shallenberger, Manager - Monitoring and Protection
Todd Eaby, Manager - Project Review

Virginia

Atlantic States Marine Fisheries Commission
Robert Beal, Executive Director

County Agencies

New Jersey

Middlesex County
- John Pulomena, County Administrator
- Mildred Scott, Sheriff
- Board of Freeholders
  - Kenneth Armwood
  - Carol Bellante, Freehold Director
  - Charles Kenny
  - Leslie Koppel
  - Shanti Narra
  - Ronald G. Rios, Freehold Director
  - Charles Tomaro, Deputy Director
  - Blanquita Valenti
- Conservation District
  - Ines Zimmerman, District Manager
- Cultural Heritage Commission

Monmouth County
- Planning Board, Environmental Council
  - Kyle Clonan
  - Michael Fedosh, Chairman

Somerset County
- Steve Peter, County Clerk
- Brett Radi, County Clerk
- Board of Freeholders
  - Mark Caliguire, Freeholder
  - Brian Gallagher
  - Brian Levine, Freeholder
  - Peter Palmer, Freeholder Deputy Director
  - Patrick Scaglione, Freeholder
  - Patricia Walsh, Freeholder Director
- Conservation District, Somerset County 4-H Center
  - Frank Calo, District Manager
- Franklin Township
  - Tomas Boccino, Prinicipal Planner
  - Matt Loper, County Engineer
- Historical Society
  - F. McGonigle, President

New York

Richmond County
- Joseph Fucito, Sheriff

Pennsylvania

Chester County
- Board of Commissioners
- Brian N. O'Leary, AICP
- Mark Rupsis, Chief Operating Officer

Carolyn Welsh, Sheriff
Planning Commission
Carrie J. Conwell, AICP, Senior Environmental Planner
Carol Stauffer, Infrastructure & Plan Review Director

Lancaster County
Christina Hausner, Solicitor
Mark Reese, Sheriff
Agricultural Preserve Board
Matt Knepper, Director
Board of Commissioners
Craig Lehman, Commissioner
Joshua G Parsons, Commissioner/Vice Chair
Robert Still, Chief Clerk
Dennis P Stuckey, President/Chair
Conservation District
Nate Kurtz
Chris Thompson, District Manager
Emergency Management Department
Randall S Gockley, Coordinator
Historical Society
Thomas Ryan, President and CEO
Parks and Recreation
Paul Weiss, Administrator
Planning Commission
James R Cowhey, AICP, Director
Leo Lutz, Chair
Terry Martin, Secretary

City Agencies

Mark Conforti, Montgomery Township, Belle Mead, NJ
Phillip Kramer, Mayor and Council Member, Franklin Township, East Milestone, NJ
Erie Dutaud, Treasurer, Franklin Township Fire District 2, Franklin Park, NJ
Christopher Cullen, Chairman, Hazlet Township Environmental Commission, Hazlet, NJ
Highlands Fire Dept, Highlands, NJ
Lawrence Township, Lawrence Township, NJ
David Maffei, Mayor, Lawrence Township, NJ, Lawrence Township, NJ
Town Council, South Brunswick Township, Monmouth Junction, NJ
Joseph Camarota, Jr., Councilman, South Brunswick Township Council, Monmouth Junction, NJ
Frank Gambatese, Mayor, South Brunswick Township, Monmouth Junction, NJ
Raymond Hayducka, Police Chief, South Brunswick Township, Monmouth Junction, NJ
Josephine Hochman, Councilwoman, South Brunswick Township Council, Monmouth Junction, NJ
Bernard Hvozdovic, Jr., Manager, South Brunswick Township, Monmouth Junction, NJ
Christopher Killmurray, Deputy Mayor, South Brunswick Township, Monmouth Junction, NJ
Alan Laird, Fire Marshal, South Brunswick Township, Monmouth Junction, NJ
Jerry Laurizio, Member, South Brunswick Township, Environmental Committee, Monmouth Junction, NJ
Barbara Nyitrai, Township Clerk, South Brunswick Township, Monmouth Junction, NJ
Brian Sullivan, South Brunswick Environmental Commission; SB Planning Dept, Monmouth Junction, NJ
Dennis Weitz, Chair, South Brunswick Environmental Commission, Monmouth Junction, NJ

Thomas Gerity, OEM Coordinator, Township of Old Bridge, Old Bridge, NJ
Owen Henry, Mayor, Old Bridge Township, Old Bridge, NJ
Princeton Council, Princeton, NJ
Robert Brennan, Vice President, Little Rocky Hill Volunteer Fire Company, Executive Board, Princeton, NJ
Theodore Chase, Council Member, Franklin Township, Princeton, NJ
Liz Lempert, Mayor, Princeton, NJ
Ed Potosnak, Princeton, NJ
William Schwarz, Jr., President, Little Rocky Hill Volunteer Fire Company, Executive Board, Princeton, NJ
Delores A. Williams, Mayor and Council of Princeton, Princeton, NJ
Sayreville Emergency Squad, Sayreville, NJ
Kennedy O'Brien, Mayor, Sayreville Township, Sayreville, NJ
Theresa Yetsko, Chairperson, Sayreville Township Environmental Commission, Sayreville, NJ
Vince Dominach, Senior Zoning Officer, Franklin Township, Somerset, NJ
Carl Hauck, PE, CME, CPWM, Franklin Township Department of Public Works, Somerset, NJ
John Hauss, Director of Fire Prevention, Franklin Township, Department of Fire Prevention, Somerset, NJ
Mark Healy, Planning Director, Franklin Township, Somerset, NJ
Gary Howarth, Coordinator, Franklin Township, Department of Emergency Management, Somerset, NJ
Chris Kelly, Franklin Township, Somerset, NJ
Ann Marie McCarthy, Township Clerk, Franklin Township, Somerset, NJ
Rajiv Prasad, Councilman at Large, Franklin Township, Somerset, NJ
Robert Vornlocker, Jr., Township Manager, Franklin Township, Somerset, NJ
Tom Zilinek, Township Engineer, Franklin Township, Somerset, NJ
Morgan First Aid Squad, South Amboy, NJ
James McGowan, Chair, South Orange Environmental Commission, South Orange, NJ

Danny Barber, Chairman, Bronx South District Council of Presidents, New York City Housing Authority, Bronx, NY
New York City Fire Dept, Brooklyn, NY
Eric Adams, President, Brooklyn Borough President, Brooklyn, NY
Inez Barron, Councilwoman- 42nd District, NYC Council, Brooklyn, NY
Keith Bray, Brooklyn Borough Commissioner, NYC Dept of Transportation, Brooklyn, NY
Chaim Deutsch, Councilman - 48th District, NYC Council, Brooklyn, NY
Anthony Drummond, Office of Brooklyn Borough President, Brooklyn, NY
Joseph Esposito, Commissioner, NYC Office of Emergency Management, Brooklyn, NY
Vincent Gentile, Councilman- 43rd District, NYC Council, Brooklyn, NY
William Guarinello, Chair, Brooklyn Community Board 11, Brooklyn, NY
Alan Maisel, Councilman - 46th District, NYC Council, Brooklyn, NY
Andre Mitchell, Chair, Brooklyn Community Board 05, Brooklyn, NY
Stephen Moran, Chair, Brooklyn Community Board 13, Brooklyn, NY
Saul Needle, Chair, Brooklyn Community Board 18, Brooklyn, NY
Daniel Nigro, Commissioner, NYC Fire Dept, Brooklyn, NY
Theresa Scavo, Chair, Brooklyn Community Board 15, Brooklyn, NY
Joanne Seminara, Chair, Brooklyn Community Board 10, Brooklyn, NY
Mark Treyger, Councilman - 47th District, NYC Council, Brooklyn, NY
Winston Von Engel, Director, Brooklyn Borough, NYC Dept of City Planning, Brooklyn, NY
Rockaway Point Volunteer Fire Dept, Far Rockaway, NY
Jonathan Gaska, District Manager, Queens Community Board 14, Far Rockaway, NY

Emily Lloyd, Commissioner, NYC Dept of Environmental Protection, Commissioner's Office, Flushing, NY
Adrienne Adams, Chair, Queens Community Board 12, Jamaica, NY
Seth Bornstein, Executive Director, Queens Economic Development Corporation, Kew Gardens, NY
Nicole Garcia, Queens Borough Commissioner, NYC Dept of Transportation, Kew Gardens, NY
Melinda Katz, President, Queens Borough President, Kew Gardens, NY
Raj Rampershad, Chair, Queens Community Board 09, Kew Gardens, NY
John Young, Director, Queens, NYC Dept of City Planning, Kew Gardens, NY
Hardy Adasko, Senior Vice President, Planning, NYC Economic Development Corporation, New York, NY
Jainey K Bavishi, Director, NYC Office of Recovery and Resiliency, New York, NY
William Bratton, Commissioner, NYC Police Dept, New York, NY
Esther Brunner, Urban Planner, NYC Mayor's Office, Environmental Coordination, New York, NY
Robie Craig, Energy Attorney, NYC Department of Citywide Administrative Services, New York, NY
Bill DeBlasio, Mayor, NYC Mayor's Office, New York, NY
Anthony Fiore, Director Energy Regulatory, NYC Mayor's Office of Sustainability, New York, NY
Andrew Genn, Senior Vice President, Ports and Transportation, NYC Economic Development Corporation, New York, NY
Bill Goldstein, Senior Advisor to the Mayor for Recovery, Resiliency, and Infrastructure, NYC Mayor's Office, New York, NY
Nate Grove, Senior Manager, NYC Parks and Recreation, Citywide Marina Operations, New York, NY
Michael Marrella, Director, Waterfront and Open Space, NYC Dept of City Planning, New York, NY
Nilda Mesa, Director, NYC Mayor's Office of Sustainability, New York, NY
James O'Neill, Commissioner, NYC Police Dept, New York, NY
Amy Peterson, Director, NYC Housing Recovery Office, New York, NY
Pamela Pettyjohn, President, NYC Service, New York, NY
William Plache, Senior Council, Environment Division, NYC Law Dept, New York, NY
Anthony Shorris, First Deputy Mayor, NYC Mayor's Office, New York, NY
Mitchell Silver, Commissioner, NYC Dept of Parks and Recreation, New York, NY
Thomas Snyder, Chief of Staff, NYC Mayor's Office, New York, NY
Scott Stringer, Comptroller, NYC Office of the Comptroller, New York, NY
Mindy Tarlow, Director, Office of Operations, NYC Mayor's Office, New York, NY
Ke Wei, Senior Policy Advisor for Energy, NYC Mayor's Office, New York, NY
Allan Zaretsky, Planner, NYC Dept of City Planning, Waterfront Revitalization Program Consistency Review, New York, NY
Daniel Zarrilli, Director, Mayor's Office of Recovery and Resiliency for the City of New York, New York, NY
Robby Schwach, Interim Chief of Staff for Eric Ulrich, NYC 32nd Council District
Eric Ulrich, Councilman - 32nd District, NYC Council, Ozone Park, NY
Bryan Block, Chair, Queens Community Board 13, Queens Village, NY
Rockaway Park Office, Rockaway Park, NY
Elizabeth Braton, Chair, Queens Community Board 10, South Ozone Park, NY
Joe Borelli, Councilman - 51st District, NYC Council, Staten Island, NY
Cesar Claro, President & CEO, Staten Island Economic Development Corporation, Staten Island, NY
Tom Cocola, Staten Island Commissioner, NYC Dept of Transportation, Staten Island, NY
Len Garcia-Duran, Director, Staten Island Borough, NYC Dept of City Planning, Staten Island, NY
Dana Magee, Chair, Staten Island Community Board 2, Staten Island, NY
Steven Matteo, Councilman - 50th District, NYC Council, Staten Island, NY
Frank Morano, Chair, Staten Island Community Board 3, Staten Island, NY
James Oddo, President, Staten Island Borough President, Staten Island, NY
Deborah Rose, Councilwoman - 49th District, NYC Council, Staten Island, NY

Nick Siclari, Chair, Staten Island Community Board 1, Staten Island, NY

Robert Burger, Corporal, Southern Regional Police Dept, Conestoga, PA
John Michener, Corporal, Southern Regional Police Dept, Conestoga, PA
Dwight R Eshleman, Supervisor, Drumore Township Board of Supervisors, Drumore, PA
Kolin McCauley, Chairperson, Drumore Township, Drumore, PA
C. Robert May, Lancaster EMS, East Lampeter Township, PA
Head of Emergency Management, East Whiteland Township Emergency Management, Frazer, PA
Kenneth Battin, Chief Fire Official, East Whiteland Township Fire Department, Frazer, PA
Susan Drummond, Supervisor, East Whiteland Township, Frazer, PA
Scott Greenly, Director of Planning & Development, East Whiteland Township, Frazer, PA
Bill Holmes, Supervisor, East Whiteland Township, Frazer, PA
Dan Kerrigan, Head of Emergency Management, East Whiteland Township Emergency Management, Frazer, PA
John Nagel, Township Manager, East Whiteland Township, Frazer, PA
Richard Orlow, Supervisor, East Whiteland Township, Frazer, PA
Kevin Boyer, Assistant Chief, Rawlinsville Volunteer Fire Dept, Holtwood, PA
Rich Fuhrman, Deputy Chief, Rawlinsville Volunteer Fire Dept, Holtwood, PA
David Jackson, Sr, Coordinator, Drumore Township Emergency Management, Holtwood, PA
Carl Strickler, Chief, Rawlinsville Volunteer Fire Dept, Holtwood, PA
James L Tollinger, Supervisor, Drumore Township Board of Supervisors, Holtwood, PA
Michael Fitzgibbons, President and CEO, Susquehanna Valley Emergency Medical Services, Lancaster, PA
Rick Kane, Chief, Eden Volunteer Fire Company, Lancaster, PA
Janice L. M. Longer, Esquire, Solicitor, Eden Township, Lancaster, PA
James Thomas, Solicitor; Blakinger, Byler & Thomas, Drumore Township, Lancaster, PA
Matt Shenk, Quick Response Service Operations Chief, Mastersonville Fire Company, Manheim, PA
David Nichols, Chair, Drumore Township Planning Commission, Peach Bottom, PA
Tracy L Tomlinson, Chief, Robert Fulton Volunteer Fire Company, Peach Bottom, PA
Ann Zemsky, Secretary, Drumore Township Planning Commission, Peach Bottom, PA
Ellis Ferguson, Chairperson, Eden Township, Quarryville, PA
Blake Huber, Chair, Eden Township Planning Commission, Quarryville, PA
Scott Kreider, Chairperson, East Drumore Township, Quarryville, PA
David G Rineer, Secretary, Eden Township Board of Supervisors, Quarryville, PA
David R Rohrer, Vice Chairman, Eden Township Board of Supervisors, Quarryville, PA
Mark Rudy, Roadmaster / Emergency Management Coordinator, Eden Township, Quarryville, PA
Lois Skiles, Secretary, Eden Township Planning Commission, Quarryville, PA

Libraries

Franklin Township Public Library, Franklin Towne Center, Franklin Park, NJ
South Brunswick Public Library, Monmouth Junction, NJ
Old Bridge Public Library, Old Bridge Township, NJ
Nancy Cohen, Library Director, Old Bridge Public Library, Old Bridge Township, NJ
Sayreville Free Public Library, Parlin, NJ
Princeton Public Library, Princeton, NJ
Sadie Pope Dowdell Public Library, South Amboy, NJ

Queens Library at Seaside, Belle Harbor, NY

Chester County Library, Exton, PA

Lancaster Public Library West - Mountville Branch, Mountville, PA
Quarryville Library, Quarryville, PA

Newspapers

The Star-Ledger, Newark, NJ
Home News Tribune, Somerville, NJ

The New York Times, New York, NY

Chester County Press, Kelton, PA
Intelligencer Journal, Lancaster, PA
The Philadelphia Inquirer, Philadelphia, PA

Landowners, Individuals, and Organizations

Seth Thomas, North Pole, AK
David Gray, Palmer, AK
Michael Crawford, Soldotna, AK
Gregory Gaither, Alexander City, AL
Clay Helton Jr, Atmore, AL
John Bates, Auburn, AL
Benjamin Black, Auburn, AL
Isaac Lindsey, Baileyton, AL
Stan Graves, birmingham, AL
Larry Padgett, Brewton, AL
Marcus Milstead, Camden, AL
Paul Jean, Cordova, AL
Billy Owens, Fairhope, AL
Brittney Adams, Flomaton, AL
Donald Hawkins Jr, Florence, AL
Thomas Sharp, Foley, AL
Bart Elrod, Gadsden, AL
Harold Pitts, Georgiana, AL
Estel Stokes, Greenville, AL
Timothy Adrian II, Haleyville, AL
James Turner, Heflin, AL
Roy Mitchell, Hodges, AL
Tad Hunter, Ider, AL
Bobby Godwin III, Luverne, AL
Morgan Beck, Mobile, AL
Jason Utesch, Mobile, AL
Drewskavious McKinney, Montgomery, AL
Mikki Frost, Opp, AL
Jeff Peterson, Opp, AL
Suzanne Frost Peterson, Opp, AL
Joel Crick, Rogersville, AL
Dale Hensley, Rogersville, AL
Tenisha Adrian, Russellville, AL
Joseph Jaster, Russellville, AL
Jimmy Davis III, Tuscumbia, AL

Matthew Davis, Tuscumbia, AL
Bart Head, Tuscumbia, AL
Christopher Miller, Valley Grande, AL
Amber Bailey, Webb, AL
Heather Johnson, Webb, AL
Diane Difante, Wetumpka, AL
Jacob Scott, Brewton, Alabama
Jerry Simms, Adona, AR
Terri Penland, Alexander, AR
Thomas Parnham, Arkadelphia, AR
Skyler Church, Atkins, AR
Theryle Ables, Bald Knob, AR
Austin Adams, Bald Knob, AR
Henry Babb, Bald Knob, AR
Barbara Brumley, Bald Knob, AR
Lyndell Brumley, Bald Knob, AR
Billy Burns Jr, Bald Knob, AR
Bobby Burns, Bald Knob, AR
David Burns, Bald Knob, AR
Gary Burrow, Bald Knob, AR
Richard Duncan, Bald Knob, AR
Darrell Glaze, Bald Knob, AR
Kenneth Glaze, Bald Knob, AR
William Glaze, Bald Knob, AR
Cody Haynes, Bald Knob, AR
Jeffrey Haynes, Bald Knob, AR
Tonya Johnson, Bald Knob, AR
Michael Johnston, Bald Knob, AR
Jamie Paulette Landis, Bald Knob, AR
Autumn Lindsey, Bald Knob, AR
Jeffery Martin, Bald Knob, AR
Kenneth Martin, Bald Knob, AR
Joseph Mcanelly, Bald Knob, AR
Hunter McGillvray, Bald Knob, AR
Shayne Pearrow, Bald Knob, AR
Raymond Phair, Bald Knob, AR
Amber Roberts, Bald Knob, AR
Troy Roberts, Bald Knob, AR
Joe Spradlin Jr, Bald Knob, AR
Elivs Stilwell, Bald Knob, AR
Rocky Stilwell, Bald Knob, AR
Derrick Tapp, Bald Knob, AR
Brendon Turner, Bald Knob, AR
Monica Turner, Bald Knob, AR
Phillip Wallace, Bald Knob, AR
Clifton Woodard, Bald Knob, AR
Phillip Goodin, Baldknod, AR
James Frock Jr, Batesville, AR
Adam King, Batesville, AR
Elizabeth Lampton, Batesville, AR
Randall Lampton, Batesville, AR

Brian Lancaster, Batesville, AR
Elizabeth Newton, Batesville, AR
Joel Newton, Batesville, AR
Tanner Jaco, Beech Grove, AR
Kaleb Howerton, Berryville, AR
Steve Hinton, Blevins, AR
Brandy Ryan, Blue Mountain, AR
Jeremy Ryan, Blue Mountain, AR
Jerry Ryan, Blue Mountain, AR
Timothy Harris, Bono, AR
Ronald Dunn, Bradford, AR
Neal Henderson, Bradford, AR
Rodney Leonard, Bradford, AR
Jonathon Mason, Bradford, AR
Karmen Mason, Bradford, AR
Brian May, Bradford, AR
John Reed, Bradford, AR
Lesa Smith, Bradford, AR
Johnny Tims, Bradford, AR
George Crumbly, Cabot, AR
Jeremy Thomas, Carlisle, AR
Jason Lampton, Cave City, AR
Christopher Cowell, Clarksville, AR
Sherman Cowell, Coal Hill, AR
Phillip Razian, Concord, AR
Royce Burkheart, Corning, AR
Steven Craft, Cove, AR
Billie Robertson, Cove, AR
Taylor Hopkins, Crossett, AR
Ronnie Lansford, Crossett, AR
Ronnie Lunsford, Crossett, AR
Tommy Pace, Damascus, AR
Jeff Woods, Damascus, AR
Tom Kirchoff, Dardanelle, AR
Robert Rodgers, Dequeen, AR
Darrell Akin, Doddridge, AR
Oliver Larue, Doddridge, AR
James Helms, Drasco, AR
Raymond Johnson, El Dorado, AR
Katie Loyd, El Dorado, AR
David Johnson, Eudora,, AR
Cody Baker, Everton, AR
Evan Jones, Everton, AR
Trevor Sneed, Fairfield Bay, AR
Brian Foster, Fayetteville, AR
Johnny Warren, Fayetteville, AR
Jilliane Fillingim, Floral, AR
Lawrence Favalora, Fort Smith, AR
James Crabtree, Fouke, AR
Jerry Crabtree Jr, Fouke, AR
Shawna Crabtree, Fouke, AR

Seth Dyas, Fouke, AR
Jen Lemley, Fouke, AR
Tim Petty, Fouke, AR
Timothy Petty, Fouke, AR
Dianne Pilgreen, Fouke, AR
Rodney Pilgreen, Fouke, AR
Shannon Johnston, Genoa, AR
Justin Taylor, Glencoe, AR
Glenn Duffy Jr, Gravette, AR
Anthony Dickinson, Green Forest, AR
Robert Finton, Greenbrier, AR
John Obrien, Greenbrier, AR
Marty O'Brien, Greenbrier, AR
Thomas Poole, Greenbrier, AR
David Starbuck, Greenbrier, AR
Michael Varner, Greenbrier, AR
Sarah A Franklin, Gurdon, AR
Gary Wharton, Guy, AR
Joseph Womack, Hamburg, AR
Robert Woods, Hamburg, AR
Randall Borders, Harrison, AR
Joseph Demeyer, Harrison, AR
Tera Demeyer, Harrison, AR
Americo Guidotti, Harrison, AR
Kevin Saul, Harrison, AR
Joshua Allbritton, Hartford, AR
Brad DeVore, Hazen, AR
Chloe Brinkley, Heber Springs, AR
Keenan Brinkley, Heber Springs, AR
Roger Burrow, Heber Springs, AR
Ronnie Chism, Heber Springs, AR
Johnny May, Heber Springs, AR
Joseph May, Heber Springs, AR
Jason Yarbrough, Heber Springs, AR
John Schwindt, Hector, AR
Jeffrey Selman, Hector, AR
Roy Mayton, Hope, AR
Christopher Miller, Hope, AR
Richard Ogburn, Hope, AR
Noah Turner, Hope, AR
Walter Deshazo, Horatio, AR
Heath Leonard, Horatio, AR
James Criswell, Hot Springs, AR
David Davis, Hot Springs, AR
D.L Johnston, Hot Springs Village, AR
Davy Johnston Jr, Hot Springs Village, AR
Cody Hibbard, Houston, AR
Kimberly Johnson, Hoxie, AR
Aubrey Rodgers, Jonesboro,, AR
Dennis Adkins, Judsonia, AR
Kevin Conway, Judsonia, AR

Mark Coyle, Judsonia, AR
Matthew Dale, Judsonia, AR
Jesse Hamby, Judsonia, AR
Rodger Hastings, Judsonia, AR
Payton Lybrand-Dale, Judsonia, AR
Joseph Martin, Judsonia, AR
James Miller, Judsonia, AR
Rickey Morgan, Judsonia, AR
Olen Throckmorton, Judsonia, AR
Candace Wyatt, Judsonia, AR
Clayton Carter, Knoxville, AR
Jadon Duncan, Lead Hill, AR
Kathy Duncan, Lead Hill, AR
Megan Frock, Lead Hill, AR
James Martin Griffith Jr, Little Rock, AR
Christopher Guthrie, London, AR
Ace Hunter, Lowell, AR
Jesse Merchant, Marshall, AR
Niki Merchant, Marshall, AR
Dora Lincoln, Maynard, AR
Michael Cingolani, McGehee, AR
Jason Wright, Mena, AR
Rodney Donaldson, Monticello, AR
Austin Flemister, Monticello, AR
Zachary Strickland, Monticello, AR
Ryan Usry, Monticello, AR
Dennis Langley, Morrilton, AR
Louie Langley, Morrilton, AR
Christopher Carter, Mount Vernon, AR
Billy Gills, Mtn. Home, AR
Jesse Davis, Oak Grove, AR
Mitchell Marriott, Oak Grove, AR
Kevin Parton, Oak Grove, AR
Bettie Denny, Oxford, AR
Robert Denny, Oxford, AR
Jeff Wagner, Ozark, AR
Rusty Wallace, Ozark, AR
Jeremy Gallegly, Pangburn, AR
Curtis Brown, Paragould, AR
Natalie Easter, Paragould, AR
Tyler Masterson, Paragould, AR
Colton Hobby, Pearcy, AR
Caleb Walker, Pearcy, AR
Angel Moore, Piggott, AR
Ron McConnell, Plumerville, AR
Terry Langley, Pottsville, AR
Randy Bryan, Prescott, AR
Mandy Lester, Quitman, AR
Tracy Lester, Quitman, AR
Jesse Webb, Quitman, AR
Damion Zaste, Quitman, AR

David Hickman, Rogers, AR
Todd Hartle, Rose Bud, AR
Jimmy Noggle, Rose Bud, AR
Joe Noggle, Rose Bud, AR
Gary Townsend, Rose Bud, AR
Betty Yarborough, Rose Bud, AR
Rick Hemmer, Russellville, AR
Tyler Schmittou, Search, AR
Stoney Chumley, Searcy, AR
Elijah Combs, Searcy, AR
Mark Drewery, Searcy, AR
Donovan Farrish, Searcy, AR
Lesley Harris, Searcy, AR
Shaun Huntsman, Searcy, AR
Jason Jernigan, Searcy, AR
Joshua Jones, Searcy, AR
John Lashlee, Searcy, AR
Terry Martin, Searcy, AR
Curtis Mason, Searcy, AR
Patrick Richards, Searcy, AR
Lee Tarwater, Searcy, AR
James Ulrich, Searcy, AR
Dillon Waggle, Searcy, AR
Cody Watkins, Searcy, AR
Charles Tyson, Sherwood, AR
Jason Knight, Sparkman, AR
John Knight Jr, Sparkman, AR
Kristi Matlock, Springdale, AR
John Mullens, Strong, AR
Frankie Watt, Strong, AR
Christopher Braswell, Taylor, AR
Dewayne Attaway, Texarkana, AR
Stanley Chapman, Texarkana, AR
JE Smokey Crabtree, Texarkana, AR
LaTonya Crabtree, Texarkana, AR
David Dukes, Texarkana, AR
Kevin Perkins, Texarkana, AR
Billy Price, Texarkana, AR
Jordan Russell, Texarkana, AR
Jimmie Feagin, Tumbling Shoals, AR
Glenn Hamm, Williford, AR
Linda McGowen-Hamm, Williford, AR
Joel Billingsley, Winthrop, AR
Charles Haynes, Bald Knob, Arkansas
Regina Wheeler, Bald Knob, Arkansas
Richard Warren, Clarksville, Arkansas
Edward Dyas, Fouke, Arkansas
Frank Petty, Fouke, Arkansas
Kevin Hartsell, Green Forest, Arkansas
Jessie Powell, Oak Grove, Arkansas
Alex Kulbeth, Cave Creek, AZ

Richard Meier, Glendale, AZ
Martin Leone, Gold Canyon, AZ
Ryan Dedman, Nazlini, AZ
Ryan Littlefield, New River, AZ
Aaron Wegener, Oro Valley, AZ
James Slavens, Page, AZ
Heidi Price, Peoria, AZ
Jerry Dodson, Phoenix, AZ
Pete Stanis, Phoenix, AZ
Eric Lewis, Sierra Vista, AZ
John McCracken, Valentine, AZ
Luskey Morris, Winslow, AZ
Jersey Bridge Property LLC, Bakersfield, CA
Timothy Dillon, Bakersfield, CA
Gary Wade, Camino, CA
Roxanne Albaugh, Ceres, CA
Mark Humphrey, Ceres, CA
Casey MacIntyre, Ceres, CA
Daryl Visser, Ceres, CA
Pam Rubitsky, Citrus Heights, CA
Cheryl Moore, Coalinga, CA
Nathaniel Williams, Corona, CA
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John Anderson, La Verne, CA
Thomas Spring, Lake Elsinore, CA
Anthony Sasso, Los Angeles, CA
William Davis, Oakdale, CA
Lenny Cordova, Pasadena, CA
MJ Cittadino, Redondo Beach, CA
Matt Gove, Mid-Atlantic Policy Manager, Surfrider Foundation, San Clemente, CA
Nick Lynn, Chair, Surfrider Foundation, San Clemente, CA
David Hurwitz, San Jose, CA
Mike Mikich, Vacaville, CA
John O'Connor, Ventura, CA
Bruce Mortland Broker, Carlsbad, California
James Mitchem, Aurora, CO
Robert Rapp, Aurora, CO
Jaime Head, Bayfield, CO
River Network, Boulder, CO
Jose Miranda, Brush, CO
Westen Haynes, Castle Rock, CO
Paul Dallaguardia, Colorado Springs, CO
Clay Foster, Colorado Springs, CO
Larry Sportsman, Colorado Springs, CO
ALMA W KENDIG TRUST ET AL C/O ROBERT L KENDIG DDS, Denver, CO
ROBERT L KENDIG II, Denver, CO
Justin Head, Durango, CO
Jacob Landers, Durango, CO
Cheryl Levi, Durango, CO
Dennis Stiles, Durango, CO
John Larson, Falcon, CO

Lanny Flora, Fort Collins, CO
Harold Vargas, Gardner, CO
Kory Zufelt, Hesperus, CO
James Hendricks, Holly, CO
Jerry Meerkatz, Johnstown, CO
Spencer Schreibvogel, Keenesburg, CO
Steve Schreibvogel, Keenesburg, CO
Bryan Greene, Littleton, CO
James Patterson, Loveland, CO
Crystal Gilbert, Mancos, CO
William Gilbert, Mancos, CO
Reginald Larkin, Pagosa Springs, CO
Patrick Penner, Platteville, CO
Diana Anderson, Silt, CO
George Haufler, Thornton, CO
Margaret Stipanovic, Westcliffe, CO
James Fleak, Westminster, CO
Harold Smith, Woodland Park, CO
Boyd Aullman, Dinosaur, Colorado
Steve McDaniel, Mack Co, Colorado
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Seth Easley, Ivoryton, CT
CCS Real Estate Holding, LLC, New Haven, CT
Tyler Duchesneau, Uncasville, CT
National Environmental Education Foundation, Washington, DC
Russ Breckenridge, Washington, DC
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David Kaiser, Rehoboth Beach, DE
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Harley Mullins, East Palatka, FL
William Breese, Fort Pierce, FL
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Anthony Potter, Hosford, FL
Helen Karcinski, Hudson, FL
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Stephen Dancy, Live Oak, FL
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Michael Hall, Merritt Island, FL
Claude King, Micanopy, FL
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Marcy Price, Naples, FL
Doug Tanner, Naples, FL
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Tyler Suralis, Riverview, FL
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Mollow Shears, St. Petersburg, FL
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Gary Strong, Tampa, FL
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Michael Hatch, Vero Beach, FL
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Benjamin Wingard, West Palm Beach, FL
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Stephen Little, Atlanta, GA
James Thomas, Ball Ground, GA
Christopher Mull, Buchanan, GA
Bob Carpenter, Buckhead, GA
Ricky Standridge, Carnesville, GA
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James Bellinghausen, Cleveland, GA

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Jacob Gaddy, Guyton, GA
Shelly Gaddy, Guyton, GA
Brian Acosta, Jasper, GA
Luis Acosta, Jasper, GA
Patrick Hammond, Macon, GA
Alec Dalrymple, Martin, GA
Melissa Hathaway, Saint Mary's, GA
James Cotton, Sandy Springs, GA
Ethan Baer, Screven, GA
William Eastwood, St. Marys, GA
Amanda Crymes, St. Marys, GA
Robin Eastwood, St. Marys, GA
Lee Wesley Glaze, Tallapoosa, GA
John Owens, Thomasville, GA
David Truitt, Thomasville, GA
Marty Garrison, Toccoa, GA
Buddy Martin, Waycross, GA
Carey McMullen, Camanche, IA
Don Donalson, Columbus Junction, IA
Megan Donalson, Columbus Junction, IA
Steve Hammons, Conesville, IA
Johnny Gardner II, Dexter IA, IA
Cody Thompson, Glenwood, IA
Martin Campbell, New Virginia, IA
Jason Dudley, Ottumwa, IA
Nicholas Merrill, Ottumwa, IA
Randy Owen, Ottumwa, IA
Brandon Webster, Ottumwa, IA
Russell Schueller, Peosta, IA
Richard Reyburn, Sioux City, IA
Derek Jaeschke, Webster City, IA
Kimberly Moore, Parma, ID
Alan Beesley, Rigby, ID
Colby Shaffer, Rigby, ID
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Merwyn Dobbs Jr, Belle Rive, IL
Tina Dobbs, Belle Rive, IL
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Gregg Santomieri, Chicago, IL
Tanya Southern, Chicago, IL
Heath Angle, Cisne, IL
Manuel Weyermann, Davis, IL

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Exelon Generation Company LLC, Oakbrook Terrace, IL
Butch Calvert, Ottawa, IL
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Brooke Divan, Rockford, IL
Nicolas Kissner, Salem, IL
Scott Hunderman, Stillman Valley, IL
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Merwyn (Petey) Dobbs, Texico, IL
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Brian Ream, Bedford, IN
Samuel Wilson, Bedford, IN
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Payton Jackson, English, IN
Zack Jones, English, IN
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Ricky Scott, Santa Claus, IN
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Penny Croner, Terre Haute, IN
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Christopher Huber, West Harrison, IN
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Walton Hines Jr, Morgantown, Kentucky
Jason Helus, Argonia, KS
Joel Mills, Cedar Vale, KS
Cody Morgan, Coffeyville, KS
Brad Tharp, El Dorado, KS
Shane Barg, Eureka, KS
Logan Kelly, Geuda Springs, KS
Marty Barth, Hays, KS
Matthew Day, Hutchinson, KS
Neb Headings, Hutchinson, KS
Marisa Horn, Hutchinson, KS
Ilya Kalinin, Hutchinson, KS

Mary Michael, Iola, KS
Jeffrey James, Marion, KS
Frank Bowker, McPherson, KS
Donald Schulz, McPherson, KS
Stephen Weller, McPherson, KS
Tara Taylor, Neosesha, KS
Ronnie Wolverton, Parsons, KS
Rodger Roberts, Pratt, KS
Alejandro Norez, Raymond, KS
Eric Adkins, Topeka, KS
Clyde Smith Jr, Toronto, KS
William Kuns, Wichita, KS
Brent Sneath, Windom, KS
Brett Johnson, Ashland, KY
Albert Pauley, Catlettsburg, KY
Ervin Kegley Jr, Clearfield, KY
Nathaniel Grinols, Dawson Springs, KY
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Mark Heath, Frankfort, KY
Terrie Bailey, Georgetown, KY
William Hawks, Glasgow, KY
Daniel Pedigo, Glasgow, KY
Charles Evans Jr, Grayson, KY
Chris North, Hebron, KY
William Quail, London, KY
Todd Caseman, Louisa, KY
Michael Williams, Louisville, KY
Jason Vincent, Mammoth Cave, KY
Gordon Rockefeller, Maysville, KY
Adrian Kidd, Morehead, KY
David Kidd, Morehead, KY
Michael Masters, Morehead, KY
Iva Pennington, Morehead, KY
Jason Pennington, Morehead, KY
Felicia Satterwhite, Mount Sterling, KY
Steve Allen Stamper, Mt Sterling, KY
Michael McDonald II, Nicholasville, KY
Jerry Bond, Olive Hill, KY
Ryan Hall, Olive Hill, KY
Tristen Hall, Olive Hill, KY
Jhan Jarrell, Olivehill, KY
David Thomas, Olivehill, KY
Corey Sagraves, Olympia, KY
Jacob Newton, Raceland, KY
William Ferguson, Rush, KY
Russell Hawks, Smiths Grove, KY
Noah Webb Jr, Smiths Grove, KY
Kenneth Powell, Somerset, KY
Keith Knox, Stanton, KY
Eric Page, Tompkinsville, KY
Jason Farler, Waco, KY

Phillip Rowe, Webbville, KY
Marvin Patrick, West Liberty, KY
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Jason Martin, Wittensville, KY
Shawn Setser, Woodburn, KY
Andrew Strehle, Worthington, KY
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Michael Hardwick, Baskin, LA
Cecil Ainsworth, Bastrop, LA
Scott Crnkovic, Bastrop, LA
Timothy O Fallon, Bastrop, LA
Matthew Franklin Jr, Bastrop, LA
Courtney Gabell, Bastrop, LA
Patrick Golden, Bastrop, LA
Chrissy Brumley Hawkins, Bastrop, LA
Chrystal Hawkins, Bastrop, LA
Donald Hawkins, Bastrop, LA
Michael Hawkins, Bastrop, LA
Brandon Jenkins, Bastrop, LA
Brian Christopher Johnson, Bastrop, LA
Rani Johnson, Bastrop, LA
Ricky Putman, Bastrop, LA
Chad Simmons, Bastrop, LA
JoBeth Winnon, Bastrop, LA
Mike Miller, Baton Rouge, LA
James Hathorn, Benton, LA
Gary Preston, Bernice, LA
Timothy Lester, Bossier City, LA
Kirby Arceneaux, Broussard, LA
Carl Wood, Calhoun, LA
Cason Sullivan, Castor, LA
John Skains Jr, Chatham, LA
Justin Hinson, Clifton, LA
Nellie Tyler, Clifton, LA
Charles Pearson, Clinton, LA
Thomas Driver, Collinston, LA
John Parker, Columbia, LA
Belinda Emory, Converse, LA
Rodney Babb, Covington, LA
Forrest Dutsch Jr, Covington, LA
Gary Loyd Jr, Covington, LA
Gary Loyd Sr, Covington, LA
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Joey Poland, Denham Springs, LA
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Michael Boyett, Dodson, LA
Jack Fluitt, Dodson, LA
Dustin Pierce, Downsville, LA
Waymon Cater, Epps, LA
Staci M. Colvin, Epps, LA
Marilyn Dickson, Epps, LA

Guy Simms, Epps, LA
Savanna Simms, Epps, LA
Tyler Simms, Epps, LA
Gerald E Martel, Eunice, LA
Jay Chapman, Farmerville, LA
Sonya Wilkerson, Farmerville, LA
William Wood, Fields, LA
Charles Houston, Florien, LA
Chad Springer, Forest, LA
Ferrell Steward, Forest, LA
Gray Steward, Forest, LA
Dave Glaviano, Forest Hill, LA
James Travis, Franklinton, LA
Jane Banes, Georgetown, LA
Michael Mellion, Gonzales, LA
Keith Cotton Sr, Gray, LA
Diana Martin, Grayson, LA
Jase Browning, Greenwell Springs, LA
Eugene Mason, Harvey, LA
Jimmy Dick, Haughton, LA
Kelly Dick, Haughton, LA
John Hankins II, Homer, LA
Lonnie Matherne, Houma, LA
Aron Pitre, Houma, LA
Mason Sanford, Jena, LA
Timmy Wright, Jones, LA
Brandon Malone, Jonesboro, LA
James Mathews, Jonesboro, LA
Robert Shelton, Kilbourne, LA
Douglas Simpson Jr, Kilbourne, LA
Timothy Thrasher, Lacombe, LA
Gary Anderson, Lake Charles, LA
Charlotte Baudoin, Lake Charles, LA
Jared Baudoin, Lake Charles, LA
Stanley Chapman, Lake Charles, LA
Preston Richard, Lake Charles, LA
Timothy Jackson, Lakecharles, LA
Carlos Plaisance, Larose, LA
Kerry Lobell, Livingston, LA
Matthew Ward, Logansport, LA
Darren Graham, Mangham, LA
Kenneth Tucker, Marion, LA
Jean Barbe, Marrero, LA
Cynthia Cook, Maurice, LA
Guy Gregory, Mer Rouge, LA
Tristan Kester, Merouge, LA
Malcardrick Jones, Minden, LA
Lewis Maddox, Minden, LA
Gregory Miller, Minden, LA
Marcus Brown, Monroe, LA
Ryan Dubois, Montgomery, LA

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Tim Lafitte, Natchez, LA
Jerry Foster, New Iberia, LA
Roy Mistretta, New Iberia, LA
Bret Baltz, New Orleans, LA
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Steve Bolden, Oak Grove, LA
Daniel F. Creech, Oak Grove, LA
Zac Crymes, Oak Grove, LA
Aaron Day, Oak Grove, LA
Bill Elkins, Oak Grove, LA
James Elkins, Oak Grove, LA
William Elkins, Oak Grove, LA
Glen Green, Oak Grove, LA
James Hankins, Oak Grove, LA
Jamie Hankins, Oak Grove, LA
Maurice Hay, Oak Grove, LA
Alton Hill, Oak Grove, LA
Ethan Hodgkins, Oak Grove, LA
Jacob Ikerd, Oak Grove, LA
Luke Johnson, Oak Grove, LA
Ricky Johnson, Oak Grove, LA
Jerry McDaniel, Oak Grove, LA
Cory McKaskle, Oak Grove, LA
Billy Schrock, Oak Grove, LA
David Spann, Oak Grove, LA
Jason Steed, Oak Grove, LA
Colin Curtis, Oak Grove, LA
Joseph Bourg, Oberlin, LA
Michael Theriot, Pearl River, LA
Todd Aucoin, Pierre Part, LA
John Wallace McNabb, Pine Grove, LA
Billy Williams, Pine Grove, LA
Larry Canoy, Pioneer, LA
Tommy Dobson, Pioneer, LA
Earnest Whatley, Pioneer, LA
Jody Ducote, Pollock, LA
Cletis Graham, Ponchatoula, LA
Joseph Nichols, Port Allen, LA
Peyton Broussard, Prairieville, LA
Billy Hand, Ragley, LA
Kyle Reeves, Ragley, LA
Chad Duhon, Rayne, LA
Christy Houston, Rosepine, LA
Robert Houston, Rosepine, LA
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Kelvin Malone, Saline, LA
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Jeffrey Doyle, Starks, LA
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Michael Moody, Sterlington, LA
Willis Tyson, Sterlington, LA
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Wendell Coker, Stonewall, LA
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Martin Hand, Sulphur, LA
Patrick Kelley, Sulphur, LA
Daniel Lebrun, Sulphur, LA
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Jesse Prietto, Thibodaux, LA
Keith Thibodaux, Thibodaux, LA
Terry Thibodeaux, Thibodaux, LA
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Teresa Brown, Vinton, LA
Derick Fontenot, Vinton, LA
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Michael Hamburg, West Monroe, LA
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James Patterson, West Monroe, LA
Ryan Reel, West Monroe, LA
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Gary Connor, Winnfield, LA
Justin Franks, Winnfield, LA
Sara Hanson, Winnfield, LA
Randy Lynn Harlan, Winnfield, LA
Shane Hyde, Winnfield, LA
Hannah Shows, Winnfield, LA
Charles Sonnier, Winnfield, LA
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Wesley Chapman Jr, Winnsboro, LA
Mason Fenn, Winnsboro, LA
Mark Ingram, Winnsboro, LA
Stanley Ingram, Winnsboro, LA
Mark Richmond, Winnsboro, LA
Glenda Sonnier, Winnsboro, LA
Chad Williams, Winnsboro, LA
Guy Williams, Winnsboro, LA
Derrel Doyal, Zachary, LA
Billy Hawkins, Zachary, LA
Jerry Manuel, Zachary, LA
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James Doherty, Blackstone, MA
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Cheryl Humphrey, Clare, MI
Robert Humphrey, Clare, MI
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Paul Birgy, Fife Lake, MI
Stephen Birgy, Fife Lake, MI
Brandy Hendershot, Fife Lake, MI
Mark Shively, Fife Lake, MI
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William Berry, Flushing, MI
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Kenneth Martin Belanger, Kingsley, MI
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Jochua Bergey, Leroy, MI
James Morgan, Leslie, MI
Peggy Morgan, Leslie, MI
Thomas Morgan, Leslie, MI
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Krissta Major, Manton, MI
Steven Blackledge, Marion, MI
Nicholas Maddox, Marion, MI
Toland Taul, Marion, MI
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Thomas Morgan Jr, Mason, MI
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Don Corner, Mcbain, MI
Deborah Pifer, McBain, MI
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Robert Helgemo, Milford, MI
Jason Wood, Millington, MI
Brad Abbott, Mount Pleasant, MI
Timothy Hart, Mt Pleasant, MI
John Shoen, Mt Pleasant, MI
Bradley Mullin, Mt. Pleasant, MI
Paul Mullin, Mt. Pleasant, MI
Roswell Hart, Mt. Pleasant,, MI
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Severin Swanson, Rodney, MI

Shasta Stewart, Roscommon, MI
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Sandra Buchan, Traverse City, MI
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John Tourangeau, Ypsilanti, MI
Jodie Baugh, Theodosia, Missouri
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Stephen Bakkum, Alexandria, MN
Kevin Coffin, Apple Valley, MN
Donna Wiant, Bagey, MN
Zachary Galley, Baxter, MN
Terry Jensen, Bemidji, MN
Clayton Johnson, Bemidji, MN
Brent Stai, Big Lake, MN
Audrey Tsinnie, Brainerd, MN
Brett Dornack, Byron, MN
Donavon Quam, Detroit Lakes, MN
Carrie Krause, Duluth, MN
David LaBorde, Duluth, MN
Todd Anderson, Emily, MN
Kristopher Drager, Faribault, MN
Todd Weldon, Faribault, MN
Todd Olson, Forest Lake, MN
Darrell Anderson, Ham Lake, MN
Shane Johnson, Lake Bronson, MN
Chelsey Bottelson, Mora, MN
James Bottelson, Mora, MN
Levi Bottelson, Mora, MN
Ray Evans, Mound, MN
William Hemze, New Market, MN
Donald King, Princeton, MN
Levi Novacek, Roseau, MN
Kurt Quam, Thief River Falls, MN
Casey Greer, Verndale, MN
Tara Greer, Verndale, MN
Foster Lysdahl, Wadena, MN
Amber Barton, Alton, MO
Brandon Morrow, Alton, MO
Daniel Guffey, Bakersfield, MO
Andrew Bacon, Belle, MO
Lyndi Schlueter, Bogard, MO
Clint Campbell, Bosworth, MO
Luke Schlorff, Cameron, MO
Samuel Laspata, Carrollton, MO
Dana Scott, Carrollton, MO

Zachery Scott, Carrollton, MO
Blake Wilson, Carrollton, MO
Carol Cole, Caulfield, MO
Austin Lair, Caulfield, MO
Austin Langkop, Centertown, MO
Charles Bryan Jr, Farmington, MO
Ryan Delashmutt, Fulton, MO
Darren Hinnah, Gilliam, MO
Travis Pritchett, Golden, MO
Ryan Elliott, Greenfield, MO
Amanda Smith, Hunnewell, MO
Todd Smith, Hunnewell, MO
Richard Grove, Independence, MO
Lincoln Pommert, Joplin, MO
Charzelle David, Kansas City, MO
Austin Ball, Koshkonong, MO
Blaine Sportsman, Laclede, MO
Amy Lippe, Lampe, MO
Scott Lippe, Lampe, MO
Donna Burd, Long Lane, MO
Larry Arnold, Mansfield, MO
Whyatt Creech, Marshfield, MO
James Hammack, Marshfield, MO
Austin Moore, Marshfield, MO
Jerry Davidson, Maysville, MO
Rebecca Allen, Mexico, MO
Paul Dowell, Monroe City, MO
Brad Mudd, Monroe City, MO
Joni Mudd, Monroe City, MO
Patrick McConnaughey, Nevada, MO
Tina Gentry, New Bloomfield, MO
Douglas Collins, Nixa, MO
Landon Criswell, Oak Grove, MO
Rufus Duron, Oronogo, MO
Krystal Worl, Ozark, MO
Ryan Moudy, Pierce City, MO
Daniel Hupp, Republic, MO
Walter Cole, Rolla, MO
Aaron Ellis, Rolla, MO
Lukas Curler, Saint James, MO
Brandon Whitworth, Scott City, MO
Mitchell Pendergraft, Seneca, MO
Travis Wetzel, Seneca, MO
Andrew Hess, Sikeston, MO
Matthew Dickens, Stockton, MO
Kenneth Schebaum, Sullivan, MO
Chance Ingles, Taneyville, MO
David Warner, Tina, MO
Robert Brown, Troy, MO
Jeffrey Parker, Troy, MO
Milan Klaus, Uniontown, MO

Daniel Jones, West Plains, MO
Larry Daniel Jones, West Plains, MO
Lacy Vick, West Plains, MO
Cody Nave, Windsor, MO
James Redmond Sr, Summersville, Mo.
Jt Born Sr., Corvallis, Montana
Nathaniel Jewell, Bay St Louis, MS
Andy Harlan, Brandon, MS
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Nick Morland, Alva, OK
Anthony Gonzalez, Anadarko, OK
Scotty Allen, Antlers, OK
Jeremy Childers, Antlers, OK
Gregory Fromme, Antlers, OK
Neil Harper, Antlers, OK
Justin Tapley, Antlers, OK
James Underwood, Antlers, OK
Howard Cook, Bartlesville, OK
Matthew Linehan, Bartlesville, OK
Chase Sutton, Bartlesville, OK

Ricky Booth, Bixby, OK
Edward Coker, Bixby, OK
Sam Free, Bixby, OK
Austin Grieger, Bixby, OK
Daniel Hendrix, Bixby, OK
Norma Hendrix, Bixby, OK
Matthew Howk, Bixby, OK
Leigh Lockard, Bixby, OK
Warren Lyda, Bixby, OK
Madison McGuire, Bixby, OK
Cody Raleigh, Blanco, OK
Jarren Andrews, Bokchito, OK
Billy Chenhall Jr, Boynton, OK
Landon Carr, Bristow, OK
Scott Halley, Bristow, OK
Dale Hays, Bristow, OK
Dwayne Base, Broken Arrow, OK
Sukarno Brown, Broken Arrow, OK
Mark Cluff, Broken Arrow, OK
Steven Downum, Broken Arrow, OK
Jayson B. Gates, Broken Arrow, OK
Barbara Hasbini, Broken Arrow, OK
Jason Hood, Broken Arrow, OK
Justin Hornback, Broken Arrow, OK
Misty Jamison, Broken Arrow, OK
Robert Kime, Broken Arrow, OK
Tracy Lee, Broken Arrow, OK
Phillip Miller, Broken Arrow, OK
Jodi Pruitt, Broken Arrow, OK
Ismael Quijada, Broken Arrow, OK
Janet Ratliff, Broken Arrow, OK
Larry Rodriguez, Broken Arrow, OK
Michael Stackhouse, Broken Arrow, OK
Joshua Summers, Broken Arrow, OK
Wendi Taylor, Broken Arrow, OK
Debra Vloedman, Broken Arrow, OK
Brian Vogt, Broken Arrow, OK
Dede Waters, Broken Arrow, OK
Travis Rowe, Burbank, OK
Justin Teague, Burbank, OK
Derek Parker, Caddo, OK
Wade Hendricks, Chouteau, OK
Justin Boen, Claremore, OK
Terri Eberhard, Claremore, OK
CHArlsey Fromme, Claremore, OK
Jeremy Fromme, Claremore, OK
Justin Wayne Fromme, Claremore, OK
Ryan Harris, Claremore, OK
William Laffoon, Claremore, OK
Cathy Orban, Claremore, OK
Liz Rogers, Claremore, OK

Justin Wallace, Claremore, OK
Becky Brown, Cleveland, OK
Patrick Faulkner, Cleveland, OK
Matthew Kesner, Cleveland, OK
Vernon Youtsey, Cleveland, OK
Danny Anderson, Colbert, OK
Nicholas Johnston, Colbert, OK
Levi McGuire, Collinsville, OK
Leroy Noll, Collinsville, OK
Chuck Clark, Coweta, OK
Robert Young, Coweta, OK
Austin Ross, Cushing, OK
Allen Ellis, Dibble, OK
Clinton Fields, Drumright, OK
Jerry Alexander, Duncan, OK
Sarah Guidotti, Duncan, OK
Jeremy Slate, Duncan, OK
Ricky Goolsby, Durant, OK
Thomas Shingledecker, Edmond, OK
Tarique Zubair, Edmond, OK
Anthony Ivanow, El Reno, OK
Misty Ivanow, El Reno, OK
Lucinda Brumfield, Enid, OK
Terry Brumfield, Enid, OK
Rowdy Morrow, Eucha, Ok
Chris Waeckerle, Eucha, OK
Charles Young, Eucha, OK
Mark Baker, Eufaula, OK
Buck Phelan, Eufaula, OK
Robert Smith, Eufaula, OK
Raymond Hoskinson, Fairfax, OK
Kevin Lane, Fort Gibson, OK
Ricky Curtis, Gans, OK
Clinton Reasnor, Gore, OK
Lori Jones, Grove, OK
Jacob Morgan, Haileyville, OK
Otis Coffelt, Haskell, OK
Cameron Baxter, Haworth, OK
Ted Cox, Haworth, OK
Stephen Morris, Haworth, OK
Mary Lissa Pierce, Haworth, OK
Daniel Castro, Henryetta, OK
Steve Dorman, Henryetta, OK
Brody Smith, Henryetta, OK
James Thomas, Henryetta, OK
Mountain Bear, Holdenville, OK
Jason Lambert, Holdenville, OK
Gregory Rogers, Holdenville, OK
Maria Diaz, Hominy, OK
Maria F. Diaz, Hominy, OK
Joseph Goodfox, Hominy, OK

Terence Piearcy, Hominy, OK
Bradley Tucker, Hominy, OK
Mitchell Wallace, Hominy, OK
Jarod Washmon, Hominy, OK
Hal Jones, Idabel, OK
Bradley Peters, Idabel, OK
Jimmie Pugh, Idabel, OK
Cody Loyd, Indianola, OK
Lee Jess Sloan, Jay, OK
John Balch, Jenks, OK
Jared DeShields, Jenks, OK
Ann Jones, Jenks, OK
Allie Smith, Jenks, OK
Perry Morgan, Kellyville, OK
Tod Chaffee, Lane, OK
Christopher Mercer, Lawton, OK
Evelyn Ellis, Lindsay, OK
Scott Presley, Marietta, OK
John Collins Jr, Mcalester, OK
James Pearce, McAlester, OK
John Whitten, McAlester, OK
Teresa Whitten, McAlester, OK
Robert Pearman, Medford, OK
Tyler Hickey, Miami, OK
Buddy Apple, Morris, OK
Gary McGoyne, Morris, OK
Micky Stanton (JR), Morris, OK
James Bear Jr, Muskogee, OK
Austin Dillon, Muskogee, OK
Colton Dunlap, Muskogee, OK
Karen Hagan, Muskogee, OK
Jody Rogers, Muskogee, OK
William Thieleke, Muskogee, OK
David Allen, Nowata, OK
Steve Allen, Nowata, OK
Kevin Grimm, Ochelata, OK
Basil Long, Ochelata, OK
Caleb Long, Ochelata, OK
Rusty Long, Ochelata, OK
Edward Bohannon, Oilton, OK
Joshua Favalora, Oilton, OK
Matthew Oleson, Oklahoma, OK
Jim Rogers, Oklahoma City, OK
Bryce Newton, Oktaha, OK
Diane Hummel, Owasso, OK
Bobby Norton, Owasso, OK
Beverly Smallwood, Owasso, OK
Chase Smallwood, Owasso, OK
Brandi Snyder, Owasso, OK
Mike Mercer, Pawhuska, OK
James L. Milleson, Pawhuska, OK

James Milleson, Pawhuska, OK
Tana Strow, Pawhuska, OK
Bruce Duncan, Pawnee, OK
Glen Ellington, Pawnee, OK
Jeffery Frizzell, Perkins, OK
Robert Spears, Perkins, OK
Dawn West, Perkins, OK
Jace Hall, Ponca City, OK
Jody Kimmell, Ponca City, OK
Shannon Tilman, Porter, OK
Loren Brashier, Porum, OK
Paden Harper, Poteau, OK
Doyle Rice, Pryor, OK
Donald Smith, Quinton, OK
Daniel Spearman, Quinton, OK
Brandon Conner, Ralston, OK
Jeannie Wiggins, Ralston, OK
Cleo Dilbeck, Red Rock, OK
Jeannie Miller, Ryan, OK
Ronnie Miller, Ryan, OK
Jimmy Blanton, Sallisaw, OK
Scott Moore, Sallisaw, OK
Luke Reasnor, Sallisaw, OK
John Blackwell, Sand Springs, OK
KImberly Brasiola, Sand Springs, OK
Mary Edmonds, Sand Springs, OK
Mark Irwin, Sand Springs, OK
Shawn Smallwood, Sand Springs, OK
Alesia Spradlin, Sand Springs, OK
Brooke Stephens, Sand Springs, OK
Bill Reilly, Sapulpa, OK
Sarah Milner, Seminole, OK
Crystal Brown, Shady Point, OK
Daniel Drew, Shady Point, OK
William Dwayne Linne, Shady Point, OK
Josh Williams, Shady Point, OK
Rex Antle, Skiatook, OK
Tommy Atkins, Skiatook, OK
Camille Cook, Skiatook, OK
Justin Stewart, Smithville, OK
Cory Vaught, Smithville, OK
Jimmy Williams, Smithville, OK
Mike Brace, Sperry, OK
Dwight Gibbs, Sperry, OK
Daniel Kerr, Sperry, OK
Danielle Walker, Sperry, OK
Trina Stelzer, Spiro, OK
Jeffrey Lambert, Stigler, OK
Beverly Conner, Stillwater, OK
Josh Alley, Stilwell, OK
Chris Bruner, Stilwell, OK

Tommy Sellers, Stilwell, OK
John Broome Jr, Stonewall, OK
Adam Collins, Stroud, OK
Frank Fuller, Stroud, OK
Jason Harden, Stuart, OK
Cortney Crouch, Tahlequah, OK
Jackie Drywater, Tahlequah, OK
Justin Sessions, Terlton, OK
Ronny Voyles Jr, Thackerville, OK
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Randy Abigt, Tulsa, OK
Cilla Ashby, Tulsa, OK
Faith Renee Ashby, Tulsa, OK
Karent Balda, Tulsa, OK
Lynne Beeson, Tulsa, OK
John Carmody, Tulsa, OK
Patrick Clay, Tulsa, OK
Karissa Cottom, Tulsa, OK
Sara Delgado, Tulsa, OK
Audrey Dinneen, Tulsa, OK
Paula Duncan, Tulsa, OK
Joanie Egan, Tulsa, OK
Maxwell Eley, Tulsa, OK
Cheryl Geiger, Tulsa, OK
Doyle Hendrix, Tulsa, OK
Max Van Horn, Tulsa, OK
Joe Jones, Tulsa, OK
Earl Kesner, Tulsa, OK
Donald Miller, Tulsa, OK
JeFF Parks, Tulsa, OK
Nathan Phillips, Tulsa, OK
Lisa Powell, Tulsa, OK
Bob Riley, Tulsa, OK
Susan Rogers, Tulsa, OK
Grant Sample, Tulsa, OK
Tammy Satterfield, Tulsa, OK
Robin Shilt, Tulsa, OK
Clifford Taylor, Tulsa, OK
Renee Vause, Tulsa, OK
Nick Verdea, Tulsa, OK
Farron Hollabaugh, Vinita, OK
Robert Smith, Wagoner, OK
Brian Sutherland, Wagoner, OK
George Houser II, Wann, OK
Jim Martin, Wann, OK
Kenneth O Neal, Watonga, OK
Jared Fain, Watts, OK
Steven Williams, Weleetka, OK
Bill Clendening, Wetumka, OK
Steve Edwards, Wetumka, OK
Alisha Goodin, Wetumka, OK

Roy Leftwich, Wetumka, OK
Robert Logan, Wetumka, OK
Randy Evans, Wheatland, OK
Sterlin Taylor, Wilburton, OK
Mose Blair Jr, Stilwell, Okla
Erica Arney, Aline, Oklahoma
Steven Rice, Antlers, Oklahoma
Paul Oakes, Ft Towson, Oklahoma
John Clemson, Aurora, OR
Richard Potje, Bend, OR
Maxwell Flynn, Eugene, OR
Brian Ek, Newberg, OR
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Brian Halchak, Acme, PA
Peter Smith, Alburtis, PA
PPL Electric Utilities Corp, Allentown, PA
Diana Applegate, Allentown, PA
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Brian Williams, Allentown, PA
Norm Bouley, Altoona, PA
Barbara Smith, Apollo, PA
Danny Coyle, Athens, PA
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Daniel Steele, Belle Vernon, PA
Jason Martin, Bellefonte, PA
Lester Hernandez, Bensalem, PA
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Randy Dively, Berli, PA
Clinton Clark, Berlin, PA
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Mykhailo Zabrodin, Bethel Park, PA

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Travis Cain, Bloomsburg, PA
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Jimmy McKnight, Bridgeville, PA
Chris Scheve, Bridgeville, PA
Bill Shaw, Bridgeville, PA
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Stan Foster, Brockway, PA
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Clark Pitcairn, Bryn Athyn, PA
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Kimberlee Askew, Canonsburg, PA
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Michael Mish, Canonsburg, PA
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David DeCristo, Canton, PA
Matt Andrews, Carbondale, PA
Timothy Brennan, Carbondale, PA
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LEOPOLD L. OTWAY, ET UX, Carlisle, PA
Chris Hrabar, Carnegie, PA
Jim Frye, Catawissa, PA
George Johnston, Central City, PA
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Welton Darl Shipe, Charleroi, PA
Daniel Long,Chester Water Authority, Engineering, Chester, NJ
ANNETTE C KENNEY, Chester Springs, PA
Montana Penton, Clarks Summit, PA
Holly Stratton-Withee, Clarks Summit, PA
Kevin Shay, Clark's Summit, PA
Tina Clemens, Claysville, PA
Chris King, Claysville, PA

Gerald Orum Jr, Claysville, PA
Marc Pattison, Claysville, PA
Charles Whitlatch, Claysville, PA
David Williams Jr, Claysville, PA
Robert Slick, Clifford Township, PA
Jim Kelly, Superintendant, Pennsylvania American Water Company, Coatesville, PA
Ed Simpson, Coatesville, PA
CDC Industrial Coatings LLC, Cochranville, PA
Durand Carson, Cogan Station, PA
Charles Griffis, Cogan Station, PA
Bruce Sampson, Cogan Station, PA
Eric Steinbacher, Cogan Station, PA
Dan Weaver, Cogan Station, PA
Michael Starkey, Columbia Cross Roads, PA
Rommy Talladay, Columbia Cross Roads, PA
Steven Berkoski, Conestoga, PA
Scott Mcchesney, Cooksburg, PA
Richard Earl, Coraopolis, PA
Nicole Goshorn, Coraopolis, PA
Kelsie Van Hoose, Coraopolis, PA
Julia Johnson, Coraopolis, PA
Jim Keibler, Coraopolis, PA
Cindy Miller, Coraopolis, PA
Peter Zsiga, Coraopolis, PA
Clint LeRoy, Cornwall, PA
Patty Thomas, Corry, PA
Richard Thomas, Corry, PA
Lawrence Westfall, Corry, PA
William Franklin, Coudersport, PA
James Raschke, Cranberry Township, PA
Brad Shindle, Cranberry Twp, PA
Timothy Reed, Creekside, PA
John Shaskas, Dallas, PA
Thomas BoccaFogli, Dalton, PA
Mary Fitzgerald, Damascus, PA
Charles Shepstone, Damascus, PA
John And Betty Sutliff, Damascus, PA
Gabriele Vannatta, Damascus, PA
Harold Vannatta, Damascus, PA
Jeffrey Whitmore, Damascus, PA
Cheryl Forte, Darby, PA
Hogan Petrik, Darlington, PA
John Piatt, Darlington, PA
Kenny Piatt, Darlington, PA
Stanley Straight, Darlington, PA
John Sommer, Delta, PA
David Jones, Dingmans Ferry, PA
Brian Middleton, Donora, PA
David Caporale, Downingtown, PA
John Conley, Downingtown, PA
Wayne Bokum, Doylestown, PA

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John S. Beiler, Drumore, PA
Elam S. Beiler, et ux, Drumore, PA
Gideon S. Beiler, et ux, Drumore, PA
David R. Boros, et ux., Drumore, PA
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James Gratzinger, Drumore, PA
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Kurt O'Donnell, et ux., Drumore, PA
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Thomas C. Smith, et ux., Drumore, PA
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Samuel D. Stoltzfus, et ux., Drumore, PA
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John A. Trimble, et al., Drumore, PA
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Travis Phillips, Duboistown, PA
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Jeffrey Cook, Dunmore, PA
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Andrea Richlin, Dushore, PA
Richard Weaver, Dushore, PA
Rick Porvaznik, East Stroudsburg, PA
Karen Beverlin, East Waterford, PA
John Ferguson, Easton, PA
Rosalie Liberatori, Easton, PA
Russ Matthews, Easton, PA
Evangelia Sidoti, Easton, PA
Robert Burdge, Eastwaterford, PA
Jeff Grove, Elizabethtown, PA
David Miller, Elverson, PA
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Dale Teeple, Equinunk, PA
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Andy Grafton, Espyville, PA
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CHANG J GUO, ET AL, Exton, PA
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MARK BRADLEY, ET UX, Exton, PA
VINCENT BROPHY, ET UX, Exton, PA
JOHN CAMPBELL, ET UX, Exton, PA
HONG CAO, ET AL, Exton, PA
KEVIN P CARNEY, ET UX, Exton, PA
HI CHAE, ET AL, Exton, PA
SANJAY CHAKRABORTY, ET AL, Exton, PA
BRIAN CHAN, ET UX, Exton, PA
YONG S CHOE, ET UX, Exton, PA
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THOMAS C CHRISTOPHER, ET UX, Exton, PA
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THOMAS F CLEVELAND, ET AL, Exton, PA
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HAIFENG CUI, ET UX, Exton, PA
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BING LIU, ET AL, Exton, PA
LI LIU, ET AL, Exton, PA
WEI LIU, ET AL, Exton, PA
ZHI LIU, ET AL, Exton, PA
STANLEY LOUIE, ET AL, Exton, PA
JINPENG MA, ET AL, Exton, PA
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David Barrett, S Abington Twp, PA
Theodore Hazelet, Saegertown, PA
Richard Pavlina, Sarver, PA
Mike Yannes, Saylorsburg, PA
Tristan Grubb, Sayre, PA
Charles Oldroyd Jr, Sayre, PA
Charles Oldroyd, Sayreville, PA
Jeffrey Leri, Scott Township, PA
Philip Condron, Scranton, PA
Anthony Sandone, Scranton, PA
Susan Benner, Sellersville, PA
Wayne Byerly, Seven Fields, PA

Leslie Cameron, Seward, PA
Taylor James, Sewickley, PA
Katie Klaber, Sewickley, PA
Sarah Lederach, Sewickley, PA
Steven Yost, Shamokin, PA
Kenneth Carr, Shavertown, PA
OMPRAKASH RAJAGOPALAN, ET AL, Short Hills, PA
Ron Myers, Smithfield, PA
Eric Hartman, somerset, PA
Travis Mosholder, Somerset, PA
Christopher Lorah, Sommerset, PA
Justin Kostelansky, South Abington Township, PA
Chris Boehmer, South Williamsport, PA
Richard Knecht, South Williamsport, PA
Jason Lattanze, Spring City, PA
James Fay, SpringBrook Township, PA
Justin Davis, Springville, PA
Bill Kelley Sr., Springville, PA
Springville Township, Springville, PA
William Kelley, Springvlle, PA
Chad Prosper, St Marys, PA
Karen Finlan, State College, PA
Douglas Kris, State College, PA
Tim Fink, Stevensville, PA
Joseph Meche, Stillwater, PA
Fred L. Ranck, et ux., Strasburg, PA
Justin Clouse, Sugar Run, PA
Anthony Smith, Sunbury, PA
Garry BOCCAFOGLI, Susquehanna, PA
Mike Grossmann, Susquehanna, PA
John Kukowski, Susquehanna, PA
Christopher Moein, Susquehanna, PA
Patricia Propert, Susquehanna, PA
Tyler Long, Sweet Valley, PA
James Troutman, Temple, PA
Charles Kinsman, Towanda, PA
Greg Perry, Towanda, PA
Chris Roof, Towanda, PA
Mitzi Deitch, Trevose, PA
Myrl Kibbe, Trout Run, PA
Patrick McCarty, Troy, PA
Nic Perna, Trucksville, PA
Michael Tucker, Tunkannock, PA
Robert Barkley, Tunkhannock, PA
Veto Barziloski, Tunkhannock, PA
Marleen Butler, Tunkhannock, PA
Peter Butler, Tunkhannock, PA
John Curtis, Tunkhannock, PA
Mark Gilpin, Tunkhannock, PA
Ed Patchcoski, Tunkhannock, PA
Rebecca Peterson, Tunkhannock, PA

Diana Petlock, Tunkhannock, PA
John Pittenger, Tunkhannock, PA
Bill Pratt, Tunkhannock, PA
Edward Setters, Tunkhannock, PA
Raymond Stiffler, Tunkhannock, PA
Gina Suydam, Tunkhannock, PA
Terri Thomas, Tunkhannock, PA
Michael Wilkes, Tunkhannock, PA
Amos Rutledge, Tyler Hill, PA
Robert Rutledge, Tyler Hill, PA
Marion Thol, Tyler Hill, PA
Bryan Daniels, Ulysses, PA
Natasha Daniels, Ulysses, PA
Andrew Hunt, Ulysses, PA
Laura Link, Ulysses, PA
James Buzzanco, Union City, PA
Michael Salansky, Uniondale, PA
Dallas Bailey, Uniontown, PA
Wayne Leeper, Valencia, PA
Mark Miller, Valencia, PA
Elaine Cumberland, Vanderbilt, PA
Garrett Felgar, Vanderbilt, PA
Brian Kim, Venetia, PA
Roy Lynch, Venetia, PA
Merlyn Fletcher, Wanamie, PA
Darryl Gulvas, Wapwallopen, PA
Jim Alderton, Washington, PA
Mark Caskey, Washington, PA
Justin Lauterbach, Washington, PA
Linda Morris, Washington, PA
Barbara A Mounts, Washington, PA
Alan Saxon, Washington, PA
Richard Williams, Washington, PA
Joe Orourke, Waterford, PA
Jane Varcoe, Waymart, PA
Joseph A Forcine, Wayne, Pa
Beth Chaim Reform Congregation, West Chester, Pa
County Of Chester, West Chester, PA
David Reilly, West Chester, PA
David S. Reilly, West Chester, PA
Steven F Rizzi, ET UX, West Chester, PA
Jim Scherrer, West Chester, PA
Tracy Bauer, West Mifflin, PA
Damon DeLuca, West Mifflin, PA
Bryan Bennett, Westfield, PA
Shawn Ingram, Wexford, PA
John Sedeski, Wilkes Barre, PA
Christopher Hetro, Wilkes-Barre, PA
David Ambrose, Williamsport, PA
Greg Banzhaf, Williamsport, PA
Duane Daniels, Williamsport, PA

Aron Lantz, Williamsport, PA
Aron Meyers, Williamsport, PA
Bryan Pauling, Williamsport, PA
Lisa Stutzman, Williamsport, PA
Tonya Weaver, Williamsport, PA
Mary Wolf, Williamsport, PA
Greg Kepler, Willow Street, PA
William King, Windber, PA
Casey Irvine, Winfield, PA
Kristen Irvine, Winfield, PA
Brad Pontz, Wormleysburg, PA
Dale Goodwin, Wrightsville, PA
Douglas Brown, Wyalusing, PA
Susan Conner, Wyalusing, PA
Barbara Hugo, Wyalusing, PA
Chris Jack, Wyalusing, PA
Katherine Kinsley, Wyalusing, PA
John Bankus, Wyoming, PA
Harry Oleksiak, Yardley, PA
Tom Brady, York, PA
Chad Martin, York, PA
Mark Marmo, Zelienople, PA
Janet Schleeter, Dushore, Pennsylvania
Glenn Ammons, East Earl, Pennsylvania
Judy Bonavita, Meshoppen, Pennsylvania
Bryan Ferguson, Beaufort, SC
Joseph Novak, Dalzell, SC
Thomas Drago, Donalds, SC
Sam Sandbothe, Pickens, SC
Thomas Brown, Sumter, SC
Craig Lange, Taylors, SC
Marion Stueny, Union, SC
Gus Neumann, Box Elder, SD
Brennan Riley, City, SD
Eric Miller, Mitchell, SD
Steven Mason, Sioux Falls, SD
Deion Sails, Sioux Falls, SD
Leon Sails, Wessington Springs, SD
Timothy Peterson, Yankton, SD
Travis Peterson, Yankton, SD
John W. Johnson, Adamsville, Tennessee
David Schroeder, Beaumont, Texas
Charles Drake, Buna, Texas
Ricky Rodriguez, Childress, Texas
Georgia Mathis, Graham, Texas
Ray Martin, Mount Calm, Texas
John Mcmillian, Sabinal, Texas
Matthew Davis, Bath Springs, TN
Colton Jeffrey Wyatt, Bath Springs, TN
Aaron Brumley, Brentwood, TN
Joel Lane, Calhoun, TN

David Wix, Clarksville, TN
Wade Collins, Cookeville, TN
Lindsay Tolley, Darden, TN
Mark Tolley, Darden, TN
Joel Crick, Fayetteville, TN
SANJEEV PRODDUTUR, ET UX, Franklin, TN
James Strange Jr, Gallatin, TN
Ronald Ferguson, Hixson, TN
Bobby Hinson, Hohenwald, TN
Frankie Singleton, Humboldt, TN
John Hayes, Huron, TN
John Boles, Jamestown, TN
Click James, Kingsport, TN
Jimmy Farley, Lafayette, TN
Colton Markus, Lawrenceburg, TN
Barry Edgin, Lexington, TN
Joseph Kuehn, Lexington, TN
Larry Rhodes, Lexington, TN
Mark Usery, Lexington, TN
Frankie Wilbanks, Lyles, TN
James Stovall, Lynnville, TN
Trevor Bass, Millington, TN
Lynn Bradford, Old Fort, TN
Joshua McGee, Parsons, TN
Gene Hall, Portland, TN
Christopher Long, Portland, TN
Jimmy Pedigo, Portland, TN
Tanya Tucker, Reagan, TN
Chris Lancaster, Scotts Hill, TN
Charlie White, Scotts Hill, TN
Diana White, Scotts Hill, TN
Phillip Lancaster, Scott's Hill, TN
John Bradford, Selmer, TN
Robert D Perry, Summertown, TN
Justin Yates, Tullahoma, TN
Richard Gross, Turtletown, TN
Timothy Griggs, Waynesboro, TN
Giri Bragger, Westmoreland, TN
Jeff Sullivan, White Bluff, TN
Kent Smith, Yuma, TN
Susan Smith, Yuma, TN
Austin Huber, Baytown, TX
Paul Davis, Nacogdoches, TX
Stephen Tingle, Abilene, TX
Patricia Chapman, Alba, TX
Jarrod Baker, Alvin, TX
Robert Michelotti, Amarillo, TX
James Mosteller, Amarillo, TX
Kenneth Poole, Amarillo, TX
Paul Watson, Amarillo, TX
Jason Reneau, Anson, TX

Jeffery Mooney, Archer City, TX
Katie Hill, Atlanta, TX
Robert McCasland, Atlanta, TX
Jacob Scoggins, Atlanta, TX
Kirk Stringer, Atlanta, TX
Waylon Reid, Amarillo, TX
Reynaldo Hernandez, Austin, TX
Michelle Ruiz, Austin, TX
Timothy Mull, Bartonville, TX
Winford Costlow Jr, Bay City, TX
Jesse Brumley, Baytown, TX
Gee Cuffy, Baytown, TX
Johnny Fisher, Baytown, TX
David Mcniel, Baytown, TX
James Ward, Baytown, TX
Black Schroeder, Beaumont, TX
Arnold Vizena, Beaumont, TX
Sam Robinson, Bedias, TX
Steven Gilmore, Bellville, TX
Micah Tyler, Belton, TX
Quentin Martinez, Big Spring, TX
Keith McDonald, Blanco, TX
Ricky Lummus, Bloomburg, TX
Joseph Misek Jr, Blossom, TX
Tanner Thompson, Bluff Dale, TX
Steve Haines, Boerne, TX
D. Brandon Williams, Bogata, TX
Calvin Swansey, Brazoria, TX
Damon Lagrone, Brenham, TX
Garrett Ferguson, Bronson, TX
Larry Ferguson, Bronson, TX
Charles Forse, Bronson, TX
Rickey Oliver, Bronson, TX
Heath Smith, Bronson, TX
David Sowell, Bronson, TX
David Wright, Bronson, TX
Jose Morado, Brownsville, TX
Edgardo Morando, Brownsville, TX
Tammy Finley, Buffalo, TX
Larry Wright, Buffalo, TX
Gary Hill, Bullard, TX
Derek Clark, Buna, TX
Jeffrey Clark, Buna, TX
Michael Guillory, Buna, TX
Derrick Dennis, Caddo Mills, TX
Krystal Dennis, Caddo Mills, TX
Bryce Beaty, Canyon, TX
Jacob Maxey, Carthage, TX
Allen Monic, Carthage, TX
Richard Brown, Center, TX
Barry Doggett, Center, TX

Harold Wells, Centerville,, TX
William Graves, Channelview, TX
Joseph Redding, Chico, TX
Michael Redding, Chico, TX
George Pointer, Cisco, TX
Curtis Lewis, Cleveland, TX
Jacob Melton, Clyde, TX
Monty Samford, Clyde, TX
Dakota Marett, Coldspring, TX
Jason Foster, Columbus, TX
Stacia Burnett, Comanche, TX
David Capps, Conroe, TX
Richard Morin, Conroe, TX
Joseph Rodriguez, Conroe, TX
James Vaughn, Conroe, TX
Riley Jacks, Converse, TX
Jason Hill, Crickett, TX
Amber Hallum, Crosby, TX
Richard Sowell, Cross Plains, TX
Carl Traweek, Cross Plains, TX
Armando Arciniega, Crowley, TX
Frank C. Hankins, Cuero, TX
Nagu Tatineni, Cypress, TX
Cassidy Croley, Daingerfield, TX
Blake Strawn, Daingerfield, TX
Joe Gaines, Dalhart, TX
Joseph Gaines, Dalhart, TX
Gregory Glover, Dallas, TX
Brett Heim, Dallas, TX
Shelly Bradley, De Kalb, TX
Alexander Somerville, Denison, TX
Roger Jordan, Devers, TX
Garrett Roquet, Devine, TX
JC Robinson, Diana, TX
Juan Robinson, Diana, TX
Jason Conner, Diboll, TX
Renee Smith, Diboll, TX
William Smith Jr, Diboll, TX
Richard Stout, Diboll, TX
James Wilder, Diboll, TX
Wendell Derrick, Dumas, TX
Ricky M Rodriguez, Dumas, TX
Carrol Lewis, Early, TX
Cesar Garza-Alfaro, Edcouch, TX
Robbie Groves, Emory, TX
Donna Ferrell, Forney, TX
Maureen Kirchdoerfer, Fort Worth, TX
Mary Caudle, Franklin, TX
David Dickerson, Frankston, TX
Kristina Dickerson, Frankston, TX
Brent Seegers, Fredericksburg, TX

Rickey Box, Frisco, TX
I. RETHINAM, ET AL, Frisco, TX
Raymie Rogers, Ft Worth, TX
Thomas Landry, Fulshear, TX
Gunner McCann, Ganado, TX
Harold Black, Glen Rose, TX
Scott Morgan, Glen Rose, TX
Kevin Groves, Godley, TX
Randall Mathis, Graham, TX
Chad Conlee, Granbury, TX
Colton McDonald, Granbury, TX
Stanley McKay, Granbury, TX
Bobbie Bahena, Grand W, TX
Herbert Fry, Grapevine, TX
Lloyd Mason, Greenville, TX
David Farmer, Hallsville, TX
Jena Guill, Hallsville, TX
Michael Bouchard, Hardin, TX
Eulan Van Schoyck, Harleton, TX
Christie Berti, Hemphill, TX
John Smith, Hemphill, TX
Karen Smith, Hemphill, TX
John Marti, Henderson, TX
Billy Shivers, Henderson, TX
Robert Evans, Highlands, TX
John Werner, Hockley, TX
Juan Rivera, Hondo, TX
GREAT VALLEY PET CEMETERY INC C/O PROP TAX DEPT, Houston, TX
HOUCK ENTERPRISES TWO INC, Houston, TX
Transcontinental Gas Pipe Line Company, LLC, Houston, TX
Mutiu Adebakin, Houston, TX
Carlos Bailey, Houston, TX
Louis Bollinger, Houston, TX
Lowell Brien, Houston, TX
Thomas Compson, Houston, TX
Aaron Cooley, Houston, TX
Jesmeen Fatema, Houston, TX
Jose Fuentes, Houston, TX
Roderick Guillory, Houston, TX
Iurie Hadirca, Houston, TX
Alvin Hebert, Houston, TX
Jordan Kirwin, Houston, TX
Logan Lobue, Houston, TX
Elliot Metzger, Houston, TX
John Neal, Houston, TX
Lawrence A. Nix, Houston, TX
Maria Carlota Palacios, Houston, TX
Wade Pridgen, Houston, TX
Eric Reigle, Houston, TX
Mark Reilly, Houston, TX
Charles Ryan, Houston, TX

Tina Seawright, Houston, TX
Wes Sutherland, Houston, TX
Natan Tran, Houston, TX
Susan Walker, Houston, TX
Raymond Woodall, Hubbard, TX
Matthew Bailey, Hull, TX
Anthony Loggins, Huntington, TX
Joshua Marberry, Huntington, TX
Debra Mott, Huntington, TX
Jarrod Lattinville, Iowa Park, TX
Jerry Tomlinson, Iredell, TX
Micheal Fitzhenry, Ivingston, TX
Joshua Folmar, Jacksonville, TX
Kevin Stringham, Jacksonville, TX
Josh Williams, Jacksonville, TX
Stephanie Williams, Jacksonville, TX
Dudley Pettry, Jasper, TX
Charles Noble, Jefferson, TX
Jerry Smoak, Jefferson, TX
Catherine Christen, Katy, TX
Debra Martinez, Katy, TX
Tom Messick, Katy, TX
Christopher Whinham, Katy, TX
Tracy Brown, Kennard, TX
Valerie Settell, Kennard, TX
Clay Lafaye, Kerrville, TX
David Peters, Kingwood, TX
John Peters, Kingwood, TX
Robert Peters, Kingwood, TX
Bryan Corbello, Kirbyville, TX
Cade Corbello, Kirbyville, TX
Michelle Hill, Kosse, TX
Charles Seale, Kosse, TX
Chelsi Seale, Kosse, TX
Logan Freeman, Kountze, TX
Mark Oliver, Kountze, TX
James Lee Mares, Krum, TX
Andrew Clendenin, LaMarque, TX
Jani Edwards, Lampasas, TX
Reagan Edwards, Lampasas, TX
Jake Linney, Laporte, TX
Dwain Campbell, Leonard, TX
Stephen Preece, Liberty Hill, TX
William Parks, Lipan, TX
Philipe Barillet, Livingston, TX
Douglas Burdine, Livingston, TX
Marshall Cain Jr, Livingston, TX
Dean Henson, Livingston, TX
John Hinson, Livingston, TX
Joseph Laubert III, Livingston, TX
Dennis Perkins, Livingston, TX

Rick Yanke, Livingston, TX
Donald Dick Jr, Llano, TX
Chad Shivers, Longview, TX
Jerry Strawn, Longview, TX
Dempsey Wells, Lorena, TX
Sergio Aguirre, Louise, TX
Mikael Ballard, Lufkin, TX
Anthony Carswell, Lufkin, TX
Christopher Elliott, Lufkin, TX
Ralph Kirkland Jr, Lufkin, TX
Le Loggins, Lufkin, TX
Robert Jason Niosi, Lufkin, TX
Constance Pavolini, Lufkin, TX
Greg Russell, Lufkin, TX
David Sexton, Lufkin, TX
William Sexton, Lufkin, TX
Dustin Willson, Lufkin, TX
Steven Osgood, Magnolia, TX
Lee Webb, Mansfield, TX
Stuart Baldwin, Manvel, TX
Jamie Johnson, Manvel, TX
Lora Thompson, Markham, TX
Patrick Baxter III, Marshall, TX
Michael Brewer, Maud, TX
Michael Dungan, Mcdade, TX
Hunter Hankins, Mckinney, TX
Mariah Eaves, Midland, TX
Regis Platek, Missouri City, TX
Christine Hale, Mobeetie, TX
Deanna Harris, Mount Vernon, TX
Daniel Belcher, Mt Pleasant, TX
Belinda Watts, Mt Pleasant, TX
John Davis, Nacogdoches, TX
David Hall, Naples, TX
James Faucett, Neches, TX
Jesse Esparza, Nevada, TX
Preston Laye, Nevada, TX
Clayton Norton, Nevada, TX
George Bissey, Odessa, TX
Jessica Manning, Onalaska, TX
Jaret Bozeman, Ore City, TX
Heath Cowan, Pampa, TX
Lloyd Soderholm, Paris, TX
Jody Williams, Paris, TX
Ronny Moser, Pearland, TX
Gilbert Burch, Pineland, TX
Bryan Fox, Pineland, TX
Ross Moore, Pleasanton, TX
Nathan McDaniel, Pollok, TX
Koty Russell, Pollok, TX
Jim Cooper, Porter, TX

Virgil Holderby Jr, Pottsboro, TX
John Sawyer, Powderly, TX
Rodney Talbott, Powderly, TX
Robert Crocker, Prairie Lea, TX
Arlene Hill, Queen City, TX
Gary Hill, Queen City, TX
Patrick Cochrane, Rainbow, TX
Dusty Hambrick, Ravenna, TX
Matt Martin, Rhome, TX
Angel Oropeza, Rice, TX
Keith Schroeder, Richmond, TX
Marvin Blankenship, Rowlett, TX
Michael Thornton, Rowlett, TX
Wendy Thornton, Rowlett, TX
Jeffery Sewell, Rusk, TX
Kyle Tullis, Rusk, TX
Shannon Allen, San Angelo, TX
Gary Gothard, San Angelo, TX
Steve Grimes, San Angelo, TX
Randall Slimak, San Angelo, TX
Kenneth Corbin, San Antonio, TX
Annie Lawhon, San Antonio, TX
John McDaniel, San Antonio, TX
Austin Morgan, San Antonio, TX
Clent Raynes, San Antonio, TX
Colton Loggins, San Augustine, TX
Doug Winter, Santa Fe, TX
Donna Murphrey, Shepherd, TX
Rachael Byars, Silsbee, TX
Alexander Sample, Spring, TX
Stephen Fleming, Sugar Land, TX
Christopher Irwin, Sugar Land, TX
Samuel Pettit, Sulphur Springs, TX
Leelynn Williams, Talco, TX
Andrew McKinney, Teague, TX
Rodney Akin, Texarkana, TX
Michael Alden, Texarkana, TX
Robert Beavers, Texarkana, TX
J W DePriest, The Woodlands, TX
Kenneth Douglas, The Woodlands, TX
Charles Goolsby, Timpson, TX
William Pulte, Tool, TX
Jason Cannon, Trenton, TX
George Stephens, Trinidad, TX
Susan Stephens, Trinidad, TX
Thomas Michaels, Trinity, TX
Robert Kindle, Troup, TX
David Davis, Tyler, TX
Tucker Stillwell, Tyler, TX
Richard Holden, Uncertain, TX
Joshua Janek, Van Alstyne, TX

Mario Garcia, Victoria, TX
Tamara Jo Stockton, Waco, TX
Keith Ainsworth, Wallis, TX
Joe Anderson, Warren, TX
Kenneth Pentlicki, Waxahachie, TX
Gary Pohlman, Waxahachie, TX
Charles Cloy, Weatherford, TX
Barry Layne Forrester, Weatherford, TX
Edwin Herring, Weatherford, TX
Jason McLain, Weatherford, TX
Gary Pope, Weatherford, TX
Kelly Buckley, West Columbia, TX
Thomas Buckley, West Columbia, TX
Michael McCann, West Columbia, TX
Phillip McCann, West Columbia, TX
Crystal Horvath Lattie, Wharton, TX
Ronald Pepper, White Oak, TX
Charles Featherston, Wichita Falls, TX
Morris Fontenot, Willis, TX
Ryan Wiggins, Willis, TX
Gregory Gallaher, Willow Park, TX
Bryan Jones, Winfield, TX
William Keith, Winnsboro, TX
Marshall Russell, Woodville, TX
John Cates, Zavalla, TX
William DuPree, Zavalla, TX
Dustin Rash, Zavalla, TX
Regan Rash, Zavalla, TX
Jonathan Ellsworth, Centerville, UT
Colby Seely, Eagle Mountain, UT
Karie Rookstool, Grantsville, UT
Jason Gunn, Logan, UT
Blake Woolley, Nephi, UT
Kellen Wentzel, Provo, UT
Terry Hardman, Sandy, UT
Daniel Ostahowski, Sandy, UT
Sarah Johnson, South Weber, UT
Scott Simonich, St. George, UT
Robert Lofland, Syracuse, UT
Robert Nagel, Taylorsville, UT
Daniel Collier, Vernal, UT
David Grow, Washington, UT
Patrick Nagel, Washington, UT
Kenneth Jones, Altavista, VA
Restore America's Estuaries, Arlington, VA
William Welkowitz, Arlington, VA
Ty Henderson, Charlottesville, VA
Glenn Coppage, Culpeper, VA
Randall Reames, Danville, VA
Jamie Goodman, Front Royal, VA
Clyde Davis, Gretna, VA

Louis Hernandez, Gretna, VA
Luke Dales, Grundy, VA
Shadrick Harris, Hampton, VA
Reginald Shears, Highland Springs, VA
Jeremy Peters, Millboro, VA
Travis Payne, Pounding Mill, VA
Jeremy Morris, Richlands, VA
Vincent Decrease, Wheeling West, VA
Ken Shafer, Woodbridge, VA
Boyd Wehrbein Jr, Orleans, VT
Sandra Sullivan, Arlington, WA
William Johnson, Battle Ground, WA
Alex Kemppainen, Battle Ground, WA
Lance Cook, Bonney Lake, WA
Kelly Hill, Colfax, WA
Kyle Hill, Colfax, WA
BHASKAR BASU, Issaquah, WA
Rick Clark, Kennewick, WA
Aczael Valdez Jr, Kennewick, WA
Robert Flanary, Kent, WA
Daniel Chavez, Lynden, WA
Donny Winberg, Pomeroy, WA
Todd Wright, Sedro Woolley, WA
Jacob Williams, Tacoma, WA
Carol Nalepa, Woodland, WA
Richard Johnston, Rainelle, West Virginia
Jacob Christie, Altoona, WI
Kim Durham, Ashland, WI
Michael Durham, Ashland, WI
Richard Tutor Jr, Ashland, WI
Cody Bennington, Beloit, WI
Michael Bennington, Beloit, WI
Gregory Robotka, Birchwood, WI
Joshua Setzer, Brule, WI
Moriah Setzer, Brule, WI
Scott Pederson, Centuria, WI
David Salzgeber, Chetek, WI
Johnathan Schultz, Chippewa Falls, WI
Oliver Fink, Couderay, WI
Nicholas Mayer, Cumberland, WI
John Morneau, Dallas, WI
Wallace Wood, Eau Claire, WI
Jason Sampson, Exeland, WI
Andrew Hurlburt, Fall Creek, WI
Dale Johnson, Glenwood City, WI
James Cain, Holmen, WI
Kelly Jellison Jr, Lacrosse, WI
Edson Blaisdell, Ladysmith, WI
Douglas Wozny, Minong, WI
Wade Steinmann, Monroe, WI
Daniel Cole, New Auburn, WI

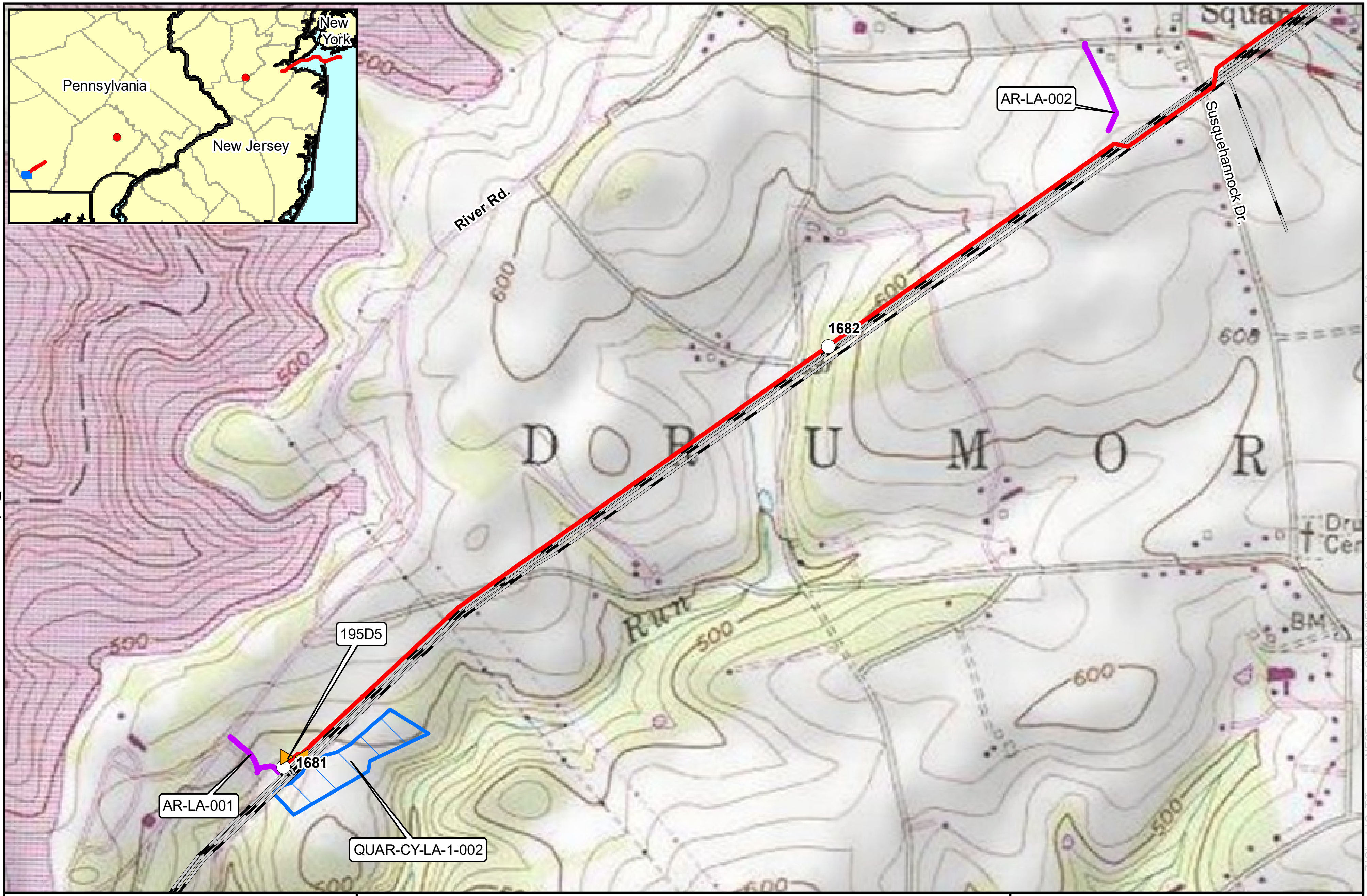
Patrick Kingsland, Poynette, WI
Michael Carothers, Racine, WI
Andrew Barney, Rice Lake, WI
Harlee Dahnke, Rio, WI
Amy Kangas, Solon Springs, WI
Peter Kangas, Solon Springs, WI
James Mark, Southrange, WI
Shane Kramer, Spring Green, WI
Frank Kuhn, Sun Prairie, WI
Jeremy Wilson, Sun Prairie, WI
James Shaver, Alum Bridge, WV
Tim Whipkey, Ansted, WV
Timothy Whipkey, Ansted, WV
Cody Carter, Beckley, WV
Jane Langston, Beckley, WV
James Walton, Beckley, WV
Jeffrey Park, Blacksville, WV
Terri Park, Blacksville, WV
Robert Harris, Bridgeport, WV
John Starkey, Bridgeport, WV
John Oldaker, Buckhannon, WV
Jeremy Lee, Cairo, WV
Judy Beresford, Cameron, WV
Eric Mason, Cameron, WV
Karen Ross, Cameron, WV
David Butterworth, Charleston, WV
John King, Charleston, WV
Gregory Mahon, Charleston, WV
Eric Sharp, Charleston, WV
Heather Boyles, Clarksburg, WV
William Jones, Clarksburg, WV
James Thomas II, Clarksburg, WV
Robert Butterworth, Clendenin, WV
Gregory Copen, Clendenin, WV
Clyde Cummings, Clendenin, WV
Jim Dotson, Clendenin, WV
Brian Fox, Clendenin, WV
Scott Jarvis, Clendenin, WV
William Brian Jones, Clendenin, WV
Jerry Taylor, Clendenin, WV
Rick Taylor, Clendenin, WV
Jason Wolfe, Clendenin, WV
Jerry Fulk, Cottageville, WV
Dee Dee Williams, Crum, WV
James Lydon, Elizabeth, WV
Christopher Fizer, Elkview, WV
James Johnson, Elkview, WV
Brett Strickland, Elkview, WV
James Cummins, Fairview, WV
Becky Thomas, Falling Rock, WV
Ted Thomas, Falling Rock, WV

Branden Batten, Frametown, WV
James Mitchell, Frametown, WV
William Lemon, Gassaway, WV
James White, Gassaway, WV
John Hundley, Genoa, WV
Steven Neely, GlenEaston, WV
Christopher Cunningham, Glenville, WV
Chris Butt, Grantsville, WV
Kevin Nelson, Hamlin, WV
Jay Lambert, Harrisville, WV
Michael Hines, Horner, WV
Brian Lloyd, Hurricane, WV
Carl Neal, Indore, WV
Shawna Layton, Jane Lew, WV
Eric Wolfe, Jane Lew, WV
Debbie Gamblin, Kingwood, WV
Roger Myers, Left Hand, WV
Shannon Sowards, Lefthand, WV
Joseph Norris, Lewisburg, WV
Sylina Norris, Lewisburg, WV
Darron Nestor, Lost Creek, WV
Austin Thomas, Lost Creek, WV
Seth Teter, Lumberport, WV
Steven Anderson, Mannington, WV
Donnie Stackpole, Mannington, WV
Dylan Duncan, Meadow Bridge, WV
Timothy Hathaway, Mineral Wells, WV
Wesley Young, Mineral Wells, WV
Daniel Miller, Morgantown, WV
Robert Morris, Morgantown, WV
Jeffrey Taylor, Morgantown, WV
Michael Glover, Moundsville, WV
Chet Gunder, Moundsville, WV
Lisa Hinerman, Moundsville, WV
William Kidd, Moundsville, WV
Cheryl Kisner, Moundsville, WV
Christopher Scamehorn, Moundsville, WV
Brandon Pumphrey, Mount Clare, WV
Josh Bullard, Nettie, WV
Joshua McCoy, New Martinsville, WV
Patti Roberts, New Martinsville, WV
Timothy Drake, Newton, WV
Tommy Drake, Newton, WV
Amanda Summers, Nitro, WV
Jeremy Taylor, Ovapa, WV
David Gainer, Parkersburg, WV
Clayton Huber, Parkersburg, WV
Joshua Alexander, Petersburg, WV
Tyler Jones, Philippi, WV
Jeffrey Wayne Taylor, Princeton, WV
Kristi Taylor, Princeton, WV

Brandon Williams, Procious, WV
Ronald Midkiff Jr, Rainelle, WV
Eugene Michaels, Ridgeley, WV
Cameran Boone, Ronceverte, WV
John Hoinville, Saint Maryâ€™s, WV
Anna Hoinville, Saint Marys, WV
Casey Carter, Saxon, WV
Warren Judge, Sistersville, WV
James Shamblin Jr, Spencer, WV
Nicholas Whytsell, St Marys, WV
Nathan Cunningham, St. Marys, WV
Mark Woodburn, St. Marys, WV
Gabe Sigler, St.marys, WV
Randy Williams Jr, Sutton, WV
Brian Hickey, Valley Grove, WV
Christopher Rodgers, Valley Grove, WV
James Powers, Volga, WV
Andrew Dudley, Wardensville, WV
David Blankenship, Wayne, WV
Jeffrey Ross, Wayne, WV
Marlene Hukill, Wellsburg, WV
Timothy Hayhurst, Weston, WV
Charles Bartlett, Wheeling, WV
Grant Elias, Wheeling, WV
Maggie English, Wheeling, WV
Keith Kongsjord, Wheeling, WV
Ryan Quinn, Wheeling, WV
Robert Richard, Wheeling, WV
Vic Wood, Wheeling, WV
Sam Horton, Williamstown, WV
Matthew Strother, Worthington, WV
Robert Trew, Buffalo, WY
Becky L Harris-Spears, Casper, WY
Chad Lummus, Casper, WY
Kevin Miller, Casper, WY
Nicholas Spears, Casper, WY
Sally Bauer-Wright, Cheyenne, WY
Justin Baur, Cheyenne, WY
Dennis Sharpe, Dayton, WY
Bradley Applebee, Douglas, WY
Micheal Runion, Douglas, WY
Kenneth Donkersgoed, Hanna, WY
Harvey Besneatte, Laramie, WY
May Herrera, Rawlins, WY
Caroline Weskamp, Rock Springs, WY
Rj Bauer, Wheatland, WY
Marcia Teten, Wheatland, WY
William K Wilson, Worland, WY

APPENDIX B

PROJECT FACILITY MAPS



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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

Page 1 of 28

Existing Transco Pipeline
Proposed Quarryville Loop
Milepost
Proposed Access Road
Proposed Main Line Valve
Proposed Contractor Yard
Cathodic Protection System

Source: Z:\Clients\Q_T\Transco\NESE_Project\ArcGIS\2018\EIS\Topo_Overview_Updated\Appendix_A_Overview_Quarryville_Pg1-6.mxd

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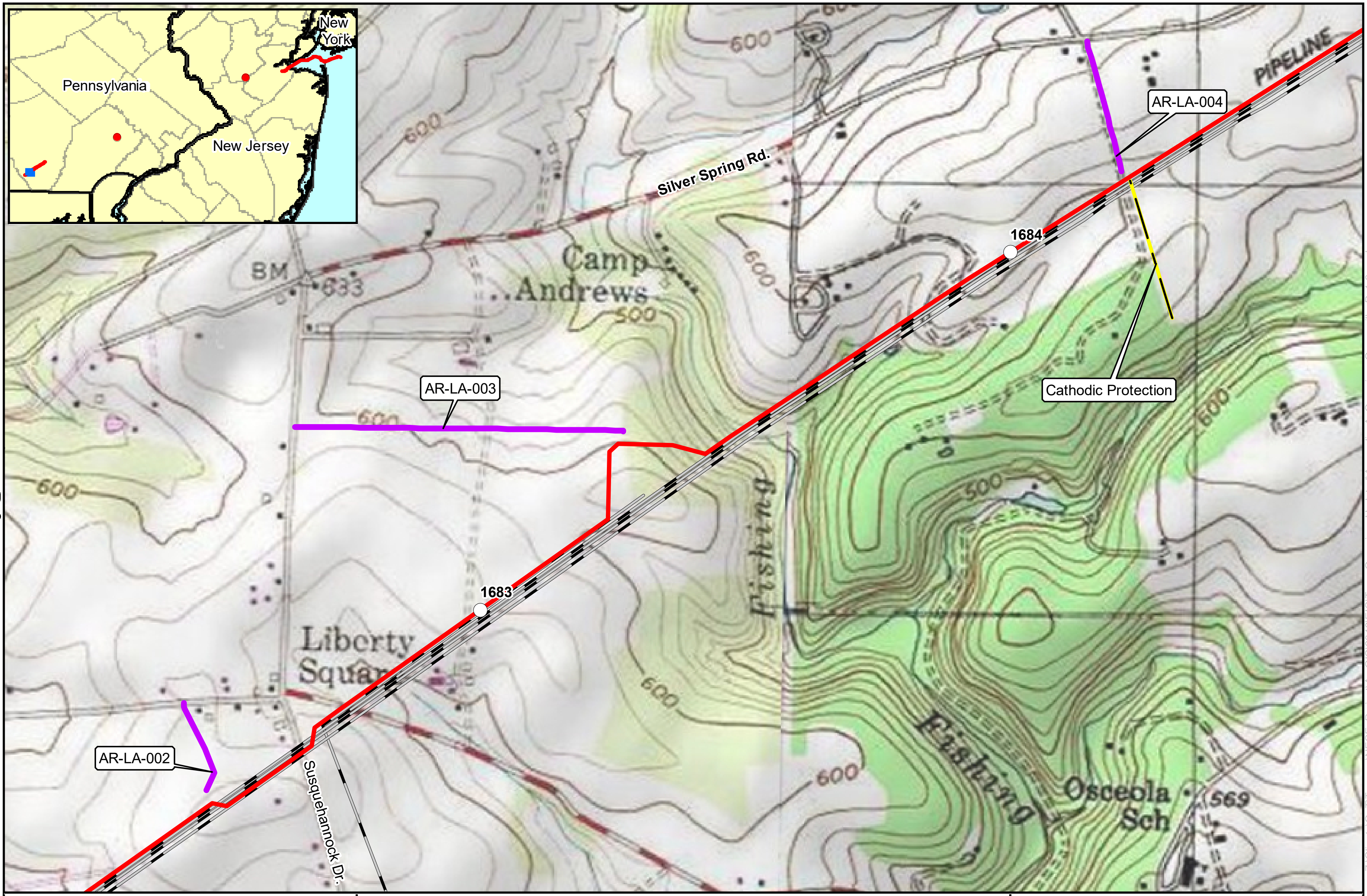

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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

Existing Transco Pipeline
Proposed Quarryville Loop
Milepost
Proposed Access Road
Proposed Main Line Valve
Proposed Contractor Yard
Cathodic Protection System

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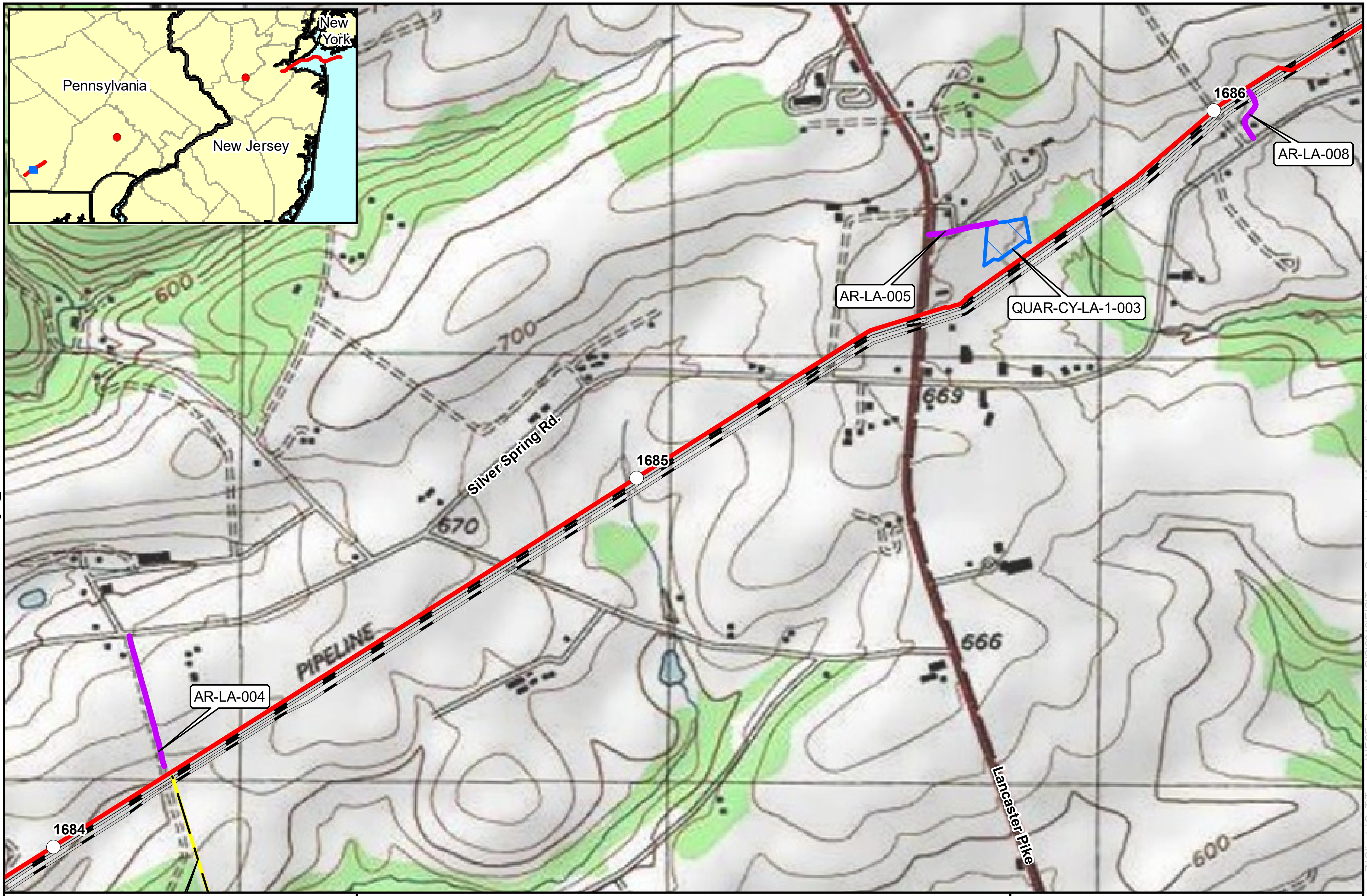

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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

- Existing Transco Pipeline
- Proposed Quarryville Loop
- Milepost
- Proposed Access Road
- Proposed Main Line Valve
- Proposed Contractor Yard
- Cathodic Protection System

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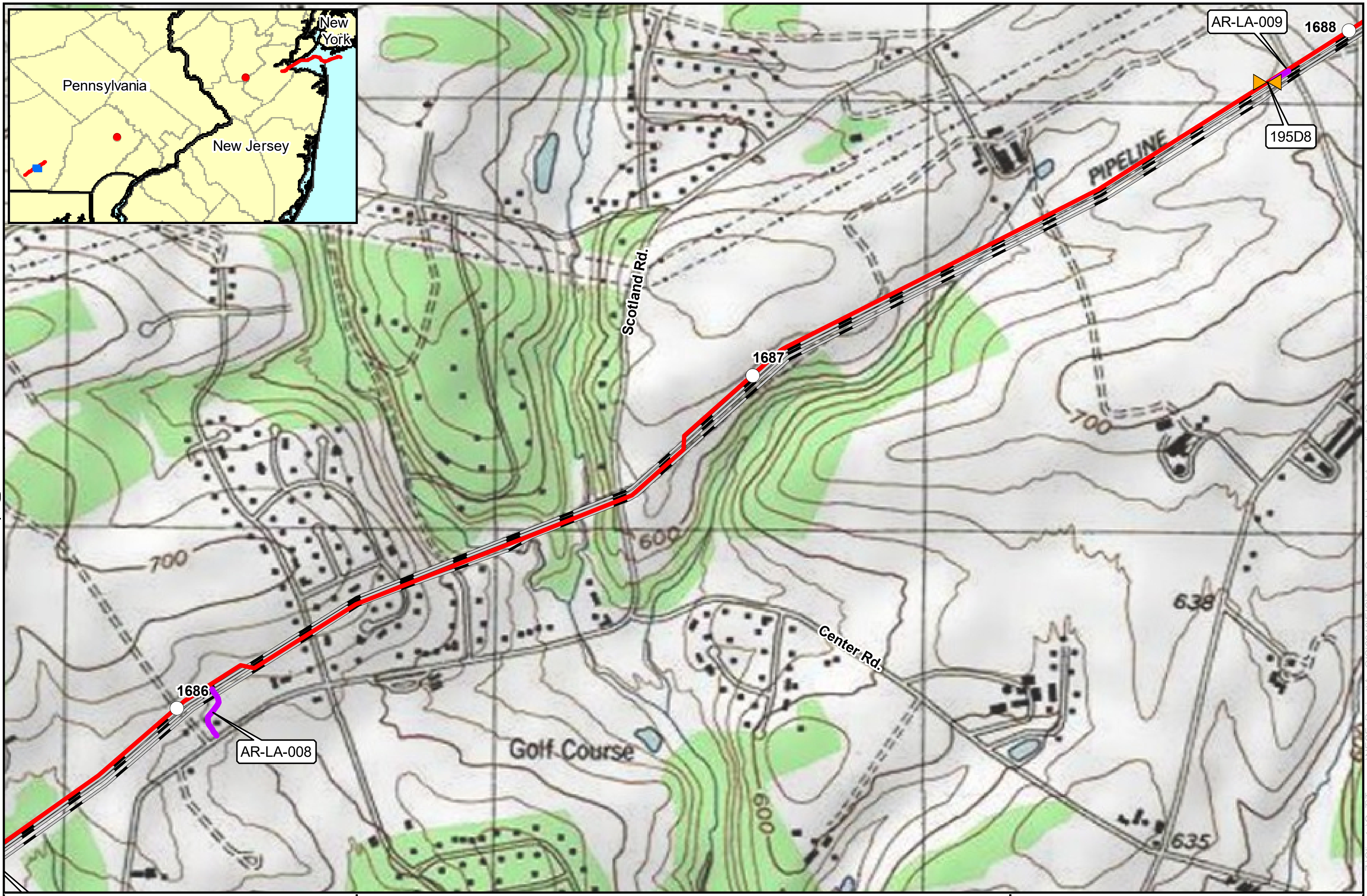

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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

- Existing Transco Pipeline
- Proposed Quarryville Loop
- Milepost
- Proposed Access Road
- Proposed Main Line Valve
- Proposed Contractor Yard
- Cathodic Protection System

Source: Z:\Clients\Q_T\Transco\NESE_Project\ArcGIS\2018\EIS\Topo_Overview_Updated\Appendix_A_Overview_Quarryville_Pg1-6.mxd
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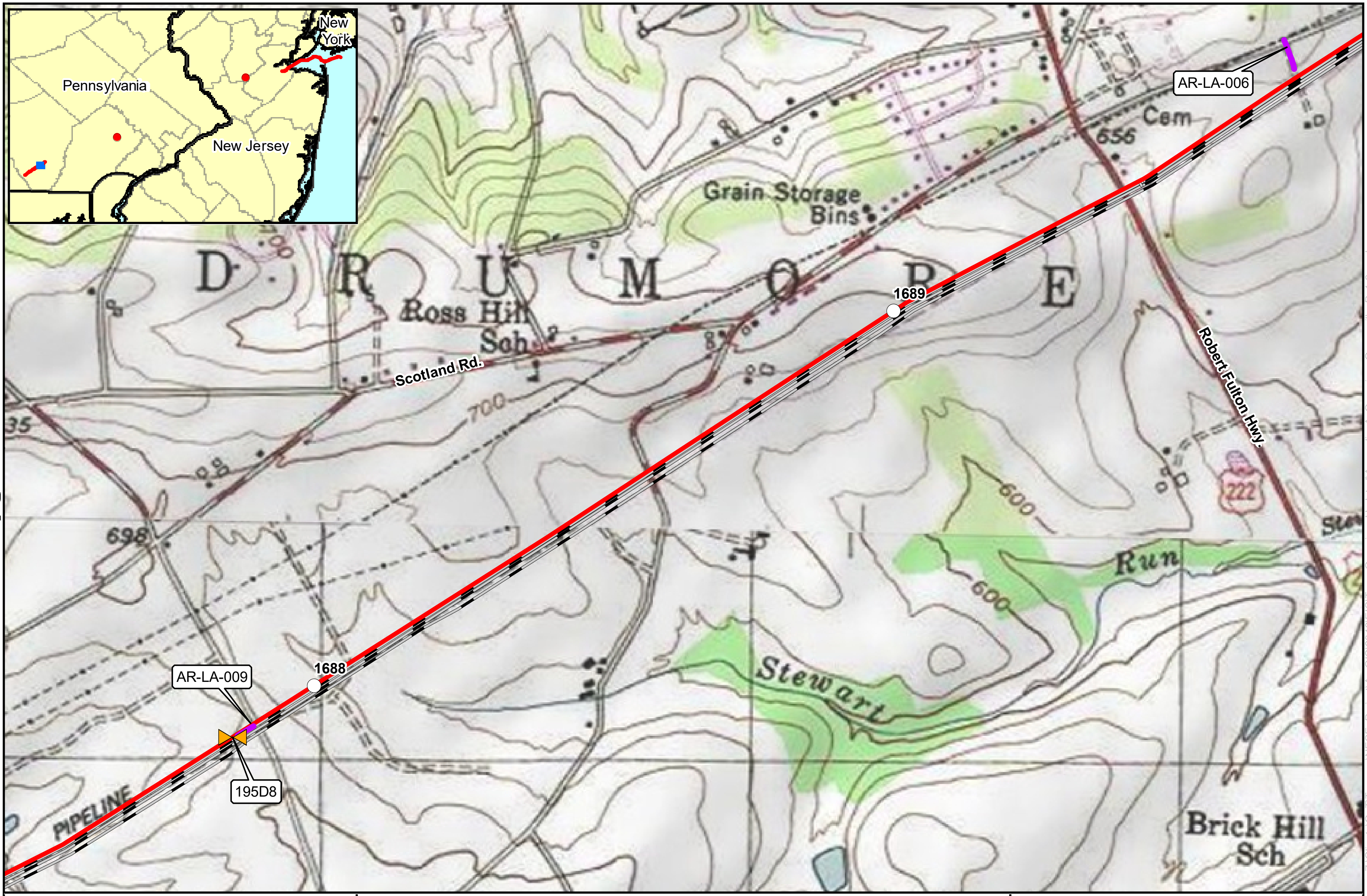

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

Page 5 of 28

Existing Transco Pipeline
Proposed Quarryville Loop
Milepost
Proposed Access Road
Proposed Main Line Valve
Proposed Contractor Yard
Cathodic Protection System

Source: Z:\Clients\Q_T\Transco\NESE_Project\ArcGIS\2018\EIS\Topo_Overview_Updated\Appendix_A_Overview_Quarryville_Pg1-6.mxd
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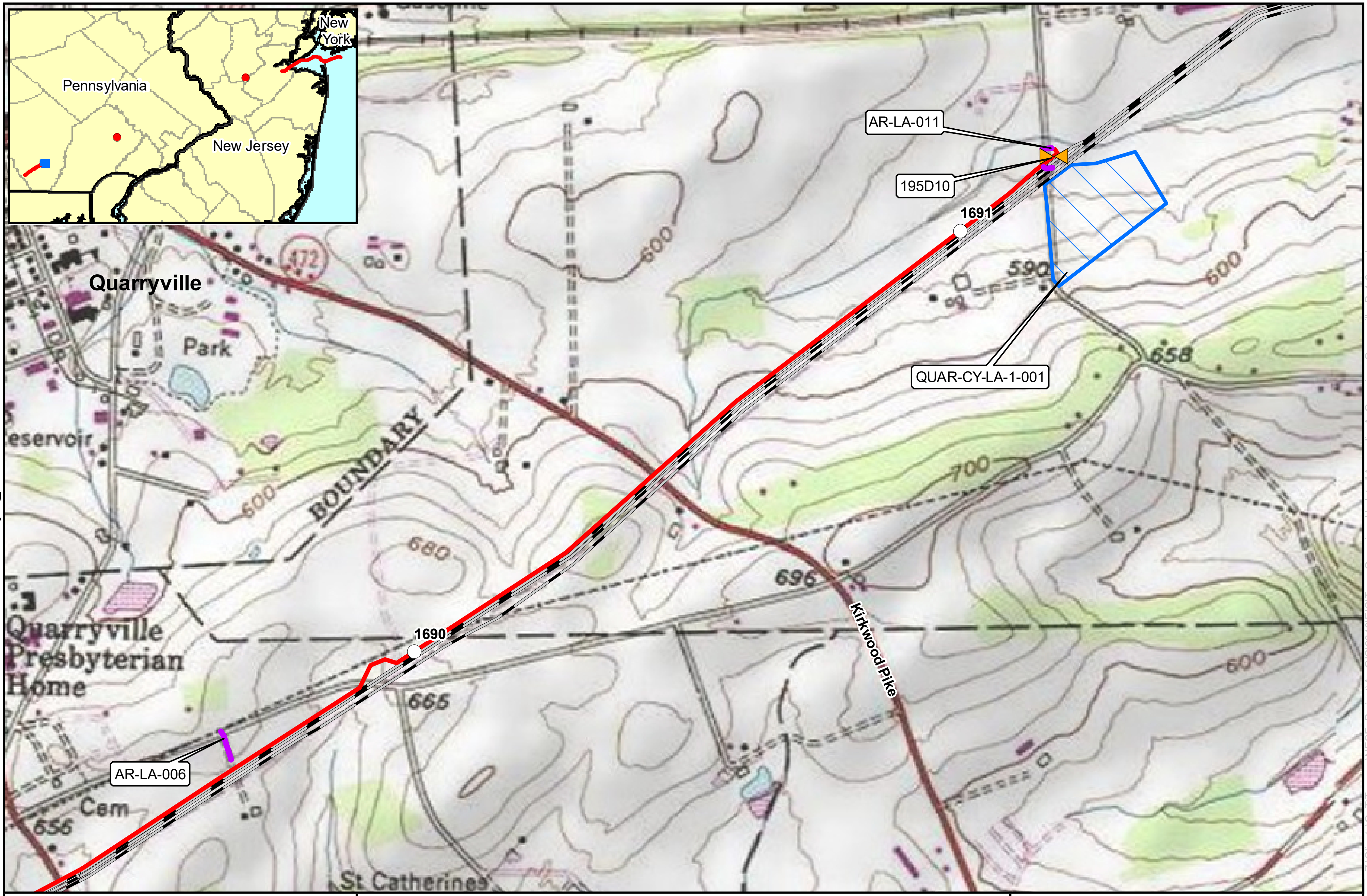

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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

Existing Transco Pipeline
Proposed Quarryville Loop
Milepost
Proposed Access Road
Proposed Main Line Valve
Proposed Contractor Yard
Cathodic Protection System

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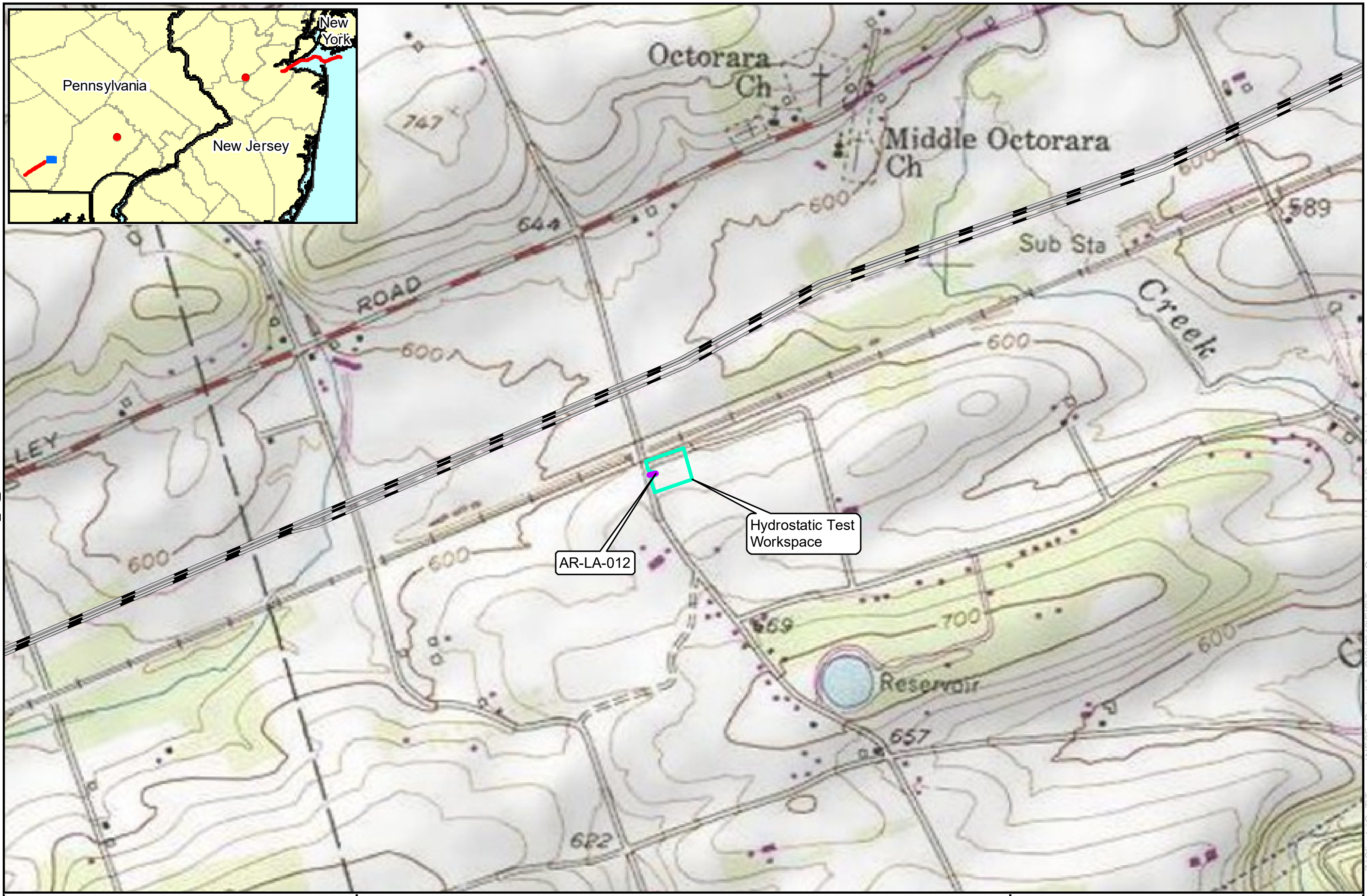

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Appendix B
Northeast Supply Enhancement Project
Quarryville Loop
Lancaster County, Pennsylvania

- Existing Transco Pipeline
- Proposed Quarryville Loop
- Milepost
- Proposed Access Road
- Proposed Main Line Valve
- Proposed Contractor Yard
- Cathodic Protection System
- Hydrostatic Test Workspace

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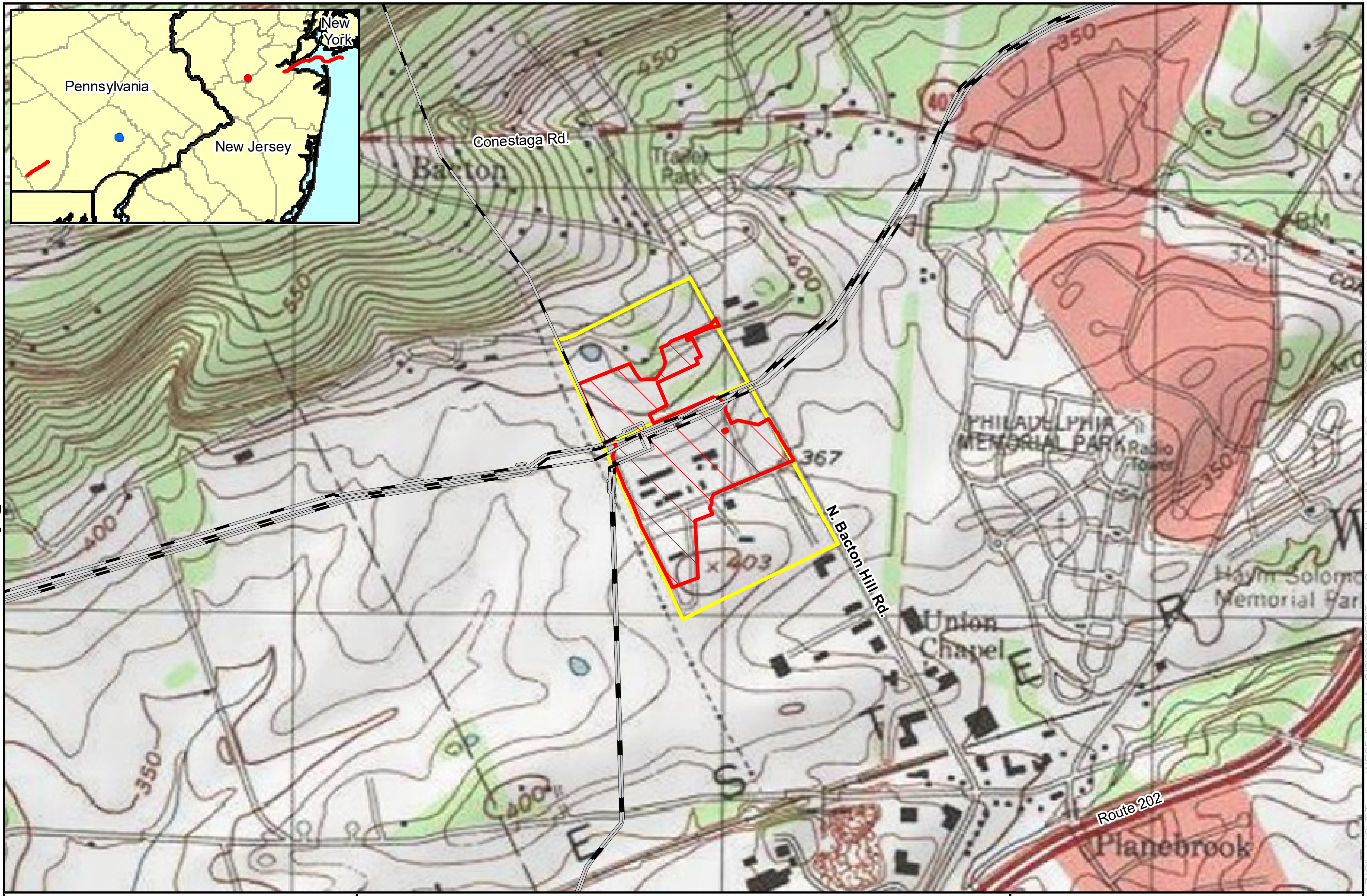

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Appendix B
Northeast Supply Enhancement Project
Compressor Station 200
Chester County, Pennsylvania

For Environmental Review Purposes Only

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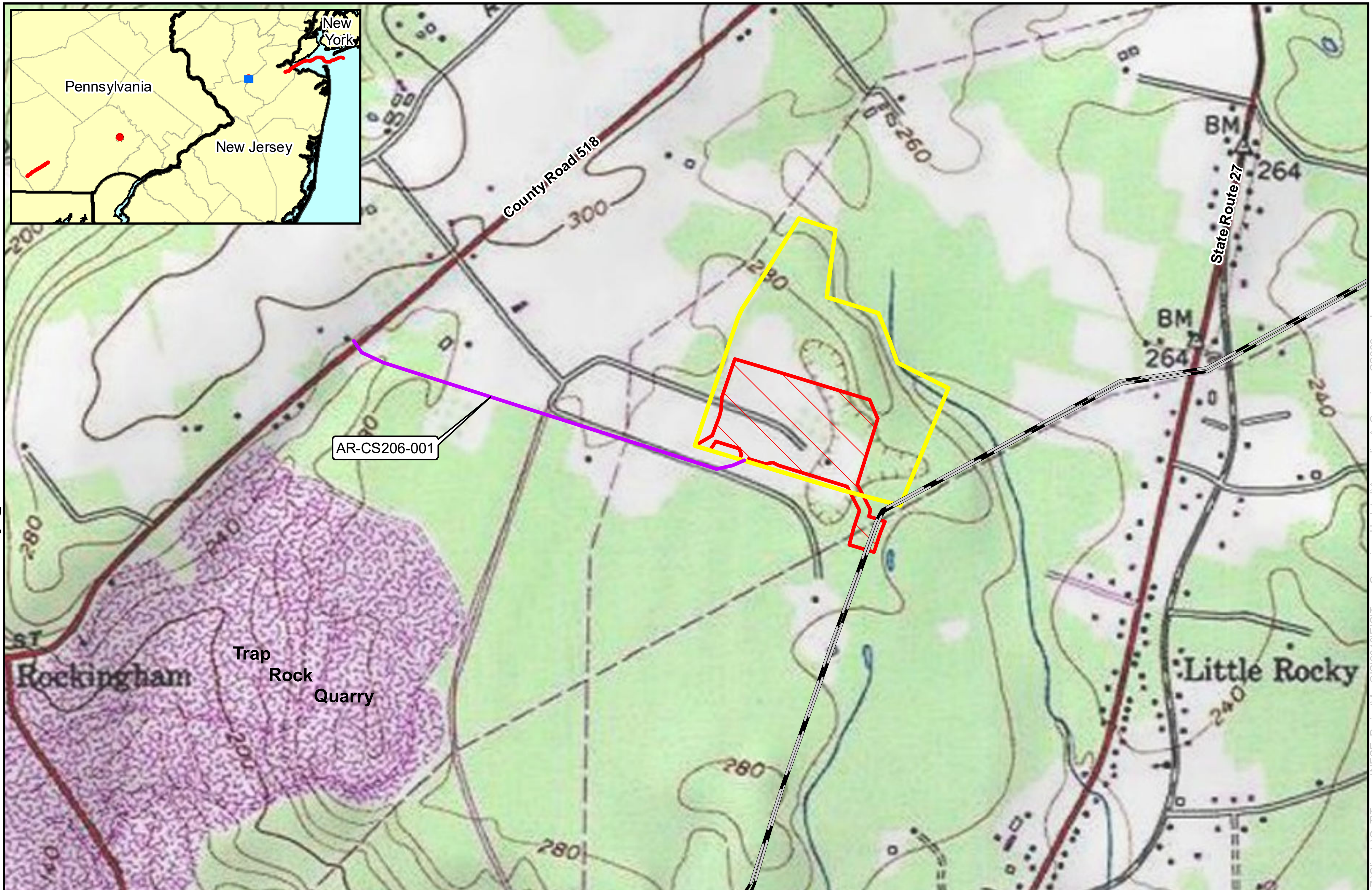

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Appendix B
Northeast Supply Enhancement Project
Compressor Station 206
Somerset County, New Jersey

- Existing Transco Pipeline
- Compressor Station 206 Workspace
- Proposed Access Road
- Compressor Station 206 Property Boundary

For Environmental Review Purposes Only

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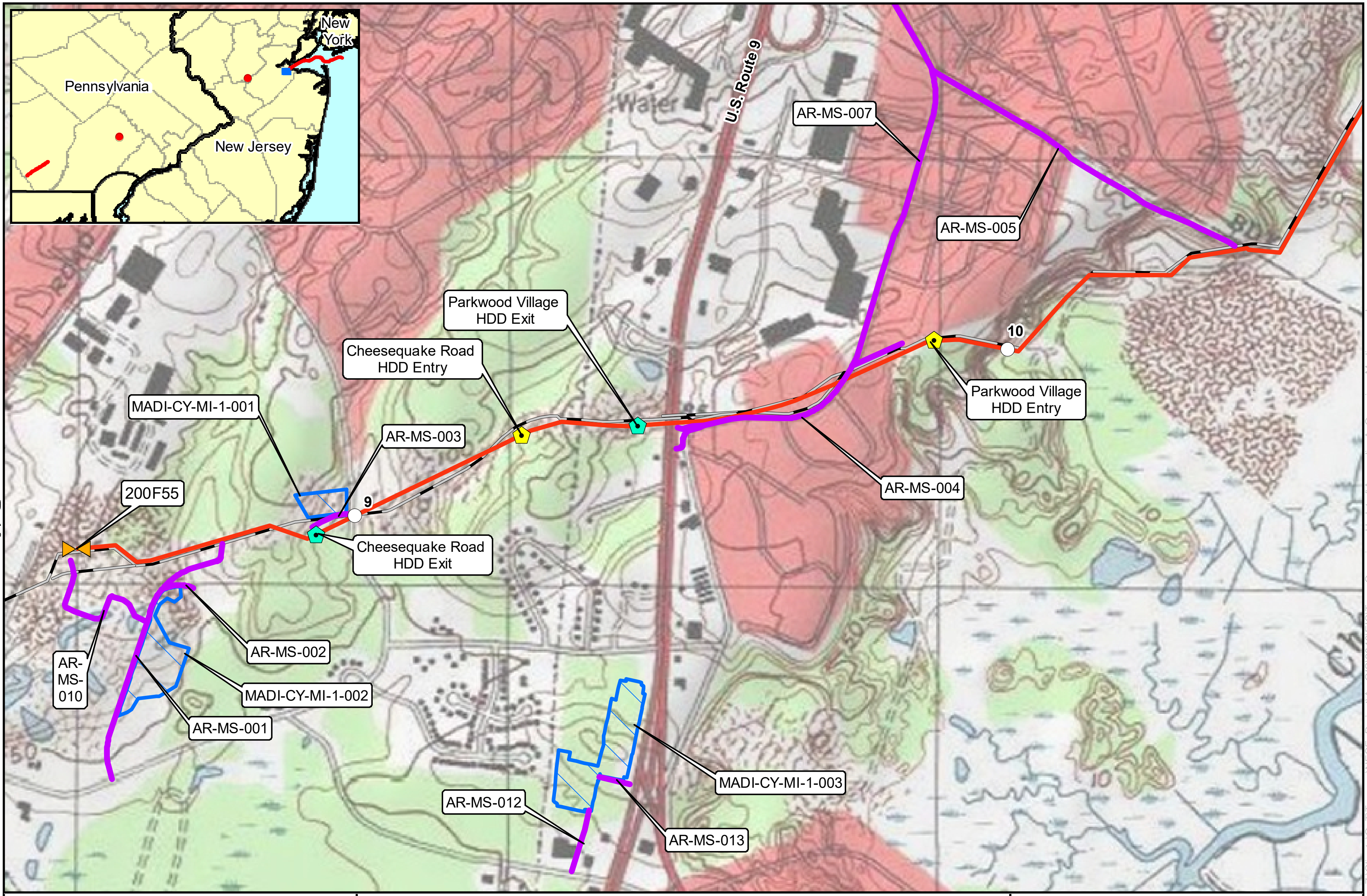

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Appendix B
Northeast Supply Enhancement Project
Madison Loop
Middlesex County, New Jersey

For Environmental Review Purposes Only

Page 10 of 28

- Existing Transco Pipeline
- Proposed Madison Loop
- Milepost
- Proposed Access Road
- Proposed Main Line Valve
- Proposed Contractor Yard
- HDD Entry
- HDD Exit

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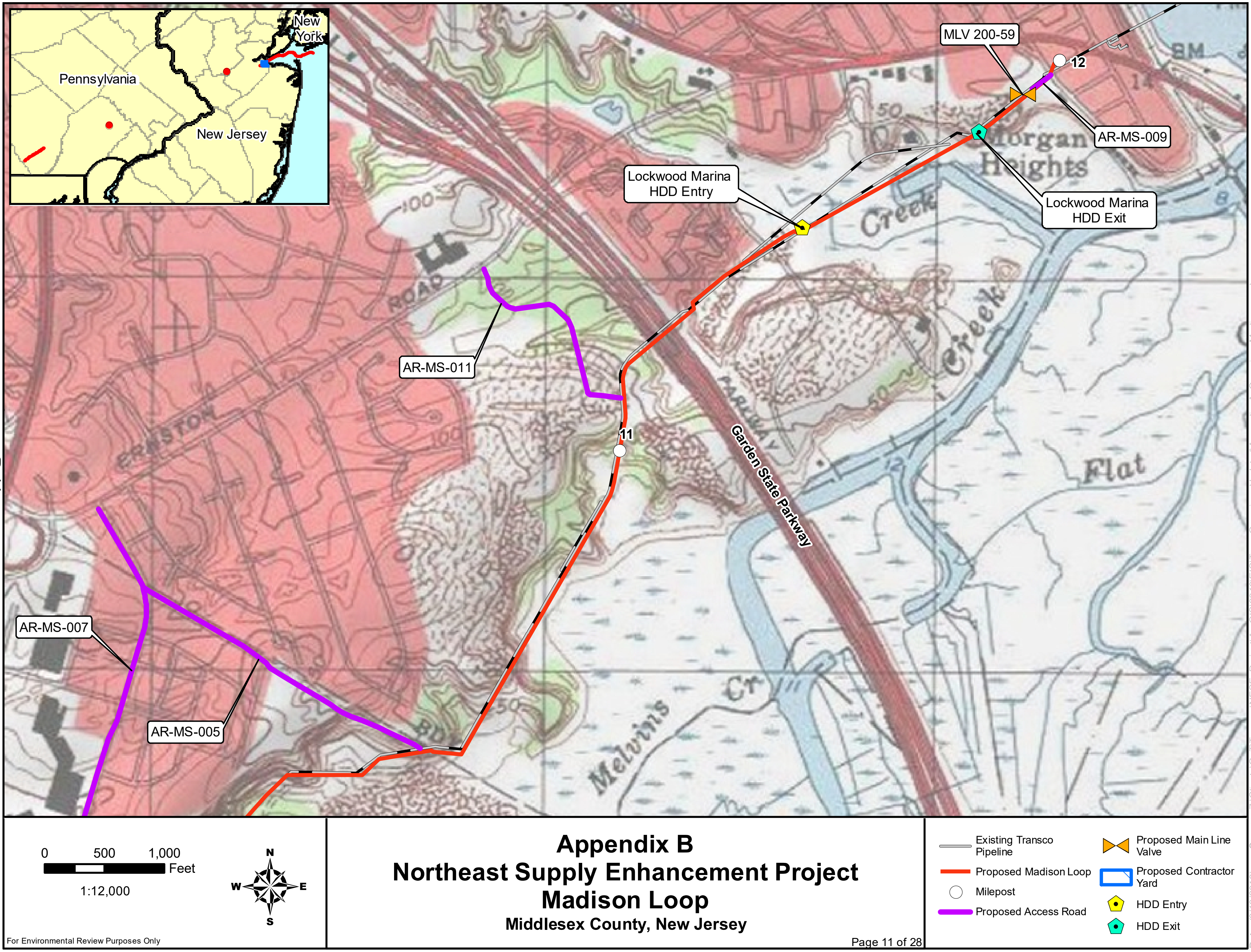

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Appendix B
Northeast Supply Enhancement Project
Madison Loop
Middlesex County, New Jersey

Existing Transco Pipeline
Proposed Madison Loop
Milepost
Proposed Access Road
Proposed Main Line Valve
Proposed Contractor Yard
HDD Entry
HDD Exit

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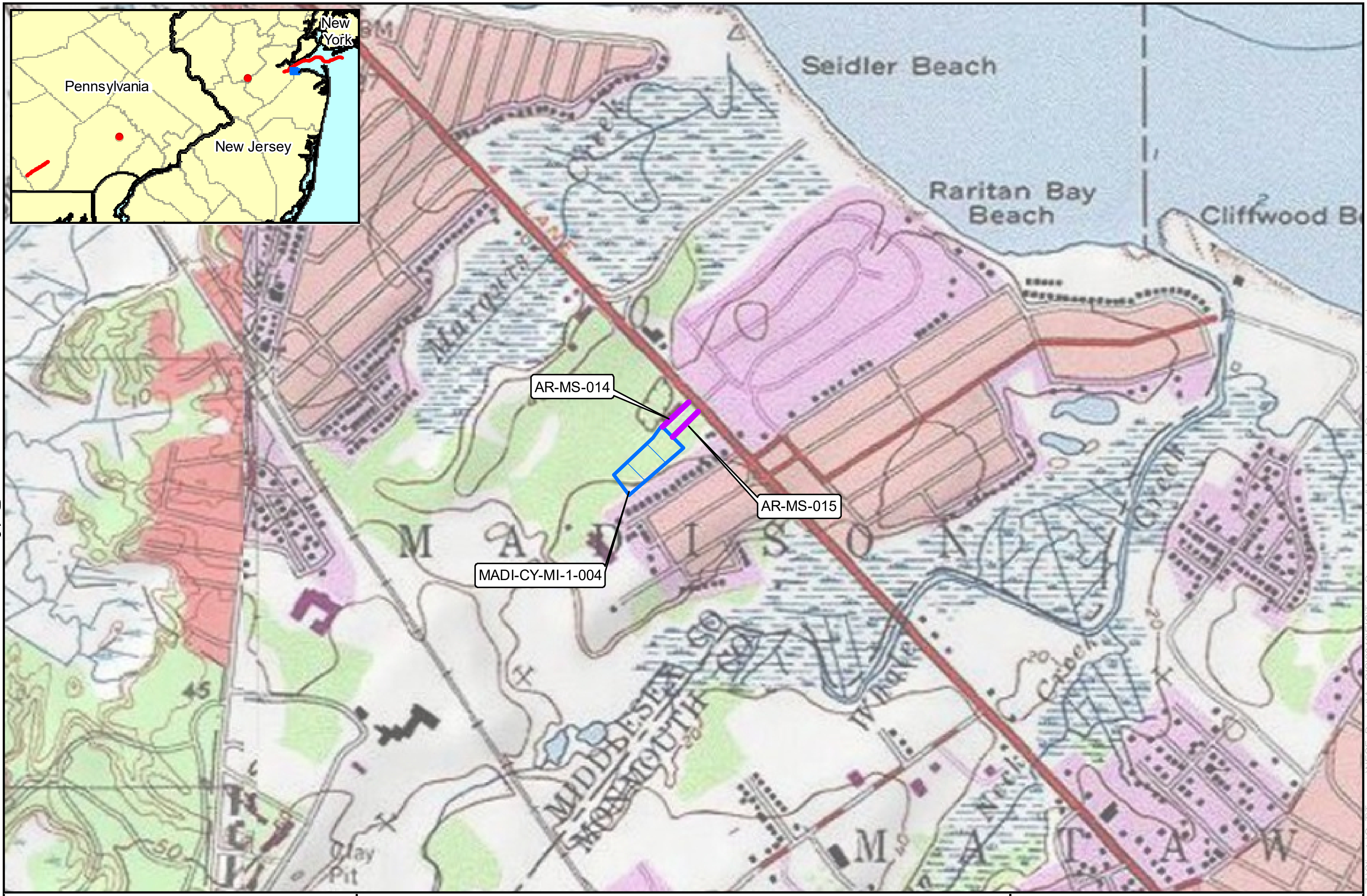

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Madison Loop
Middlesex County, New Jersey

- Existing Transco Pipeline
- Proposed Madison Loop
- Milepost
- Proposed Access Road
- Proposed Main Line Valve
- Proposed Contractor Yard
- HDD Entry
- HDD Exit

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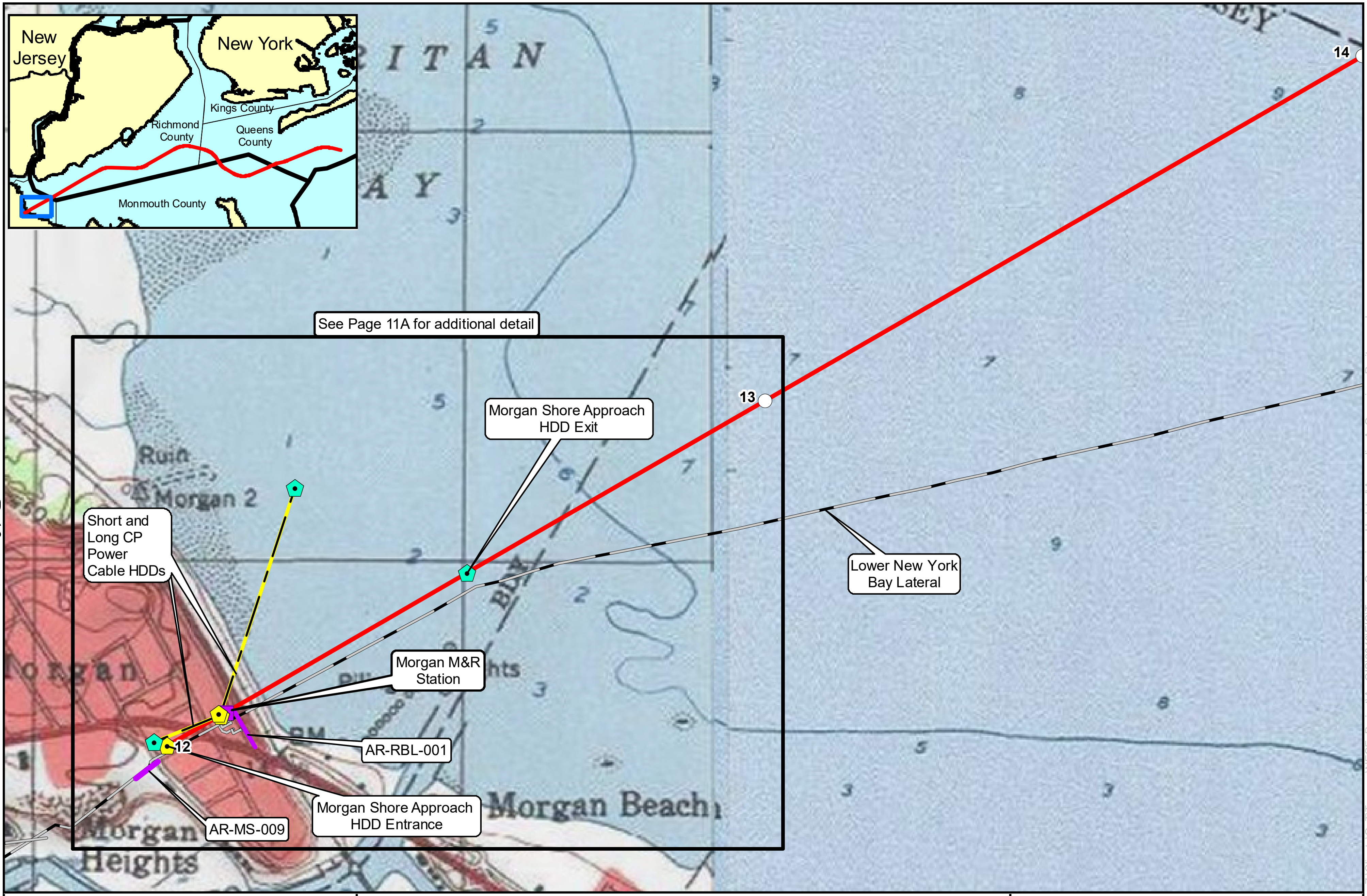

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Middlesex County, New Jersey

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

Source: Z:\Clients\Q_T\Transco\NESE_Project\ArcGIS\2018\EIS\Topo_Overview_Updated\Appendix_A_Overview_Raritan.mxd

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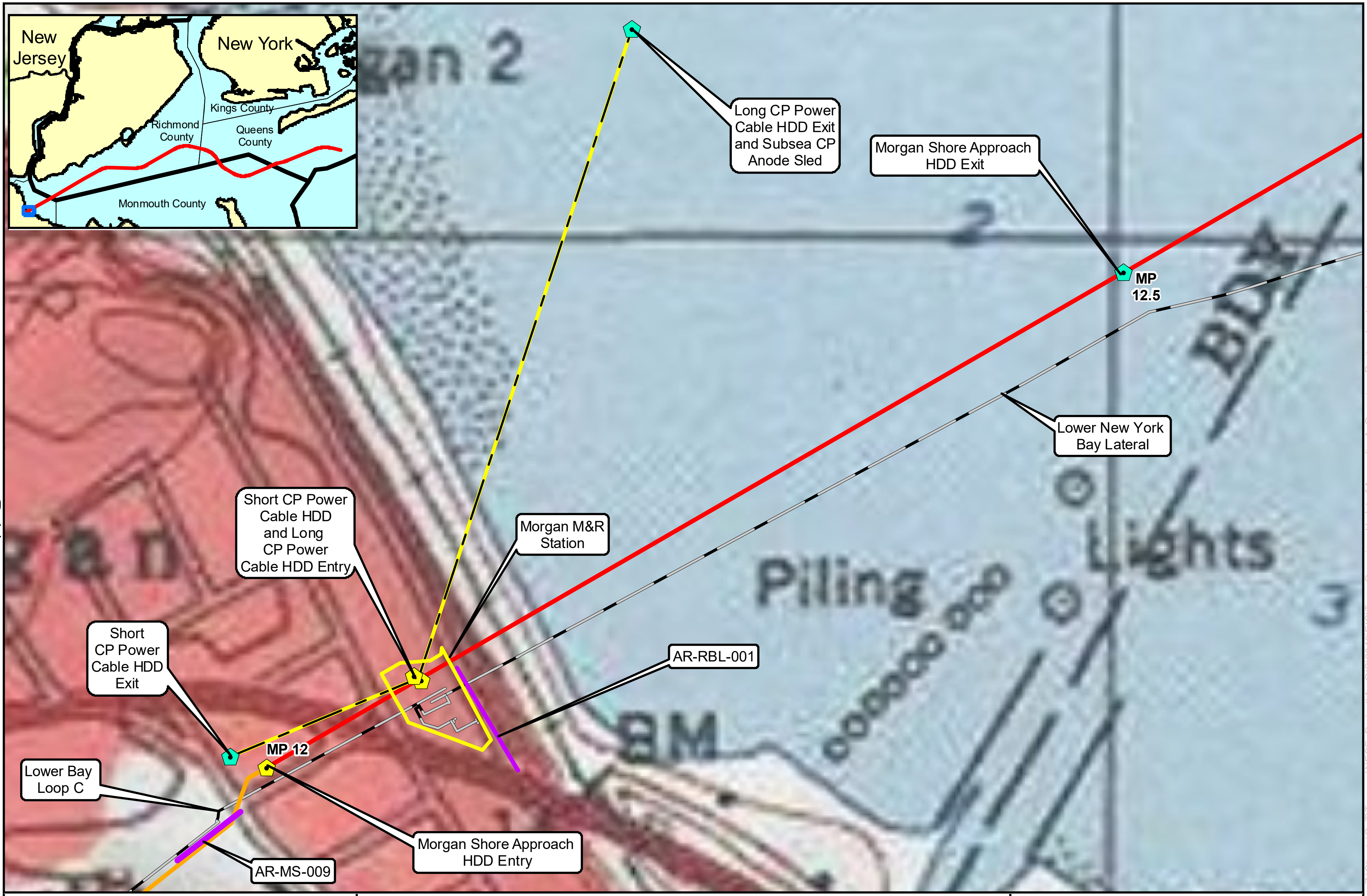

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Middlesex County, New Jersey

Page 13A of 28

Existing Transco Pipeline
Proposed Raritan Bay Loop
Proposed Madison Loop
Proposed Access Road
Cathodic Protection System
HDD Exit
HDD Entry
Morgan M&R Station

B-14

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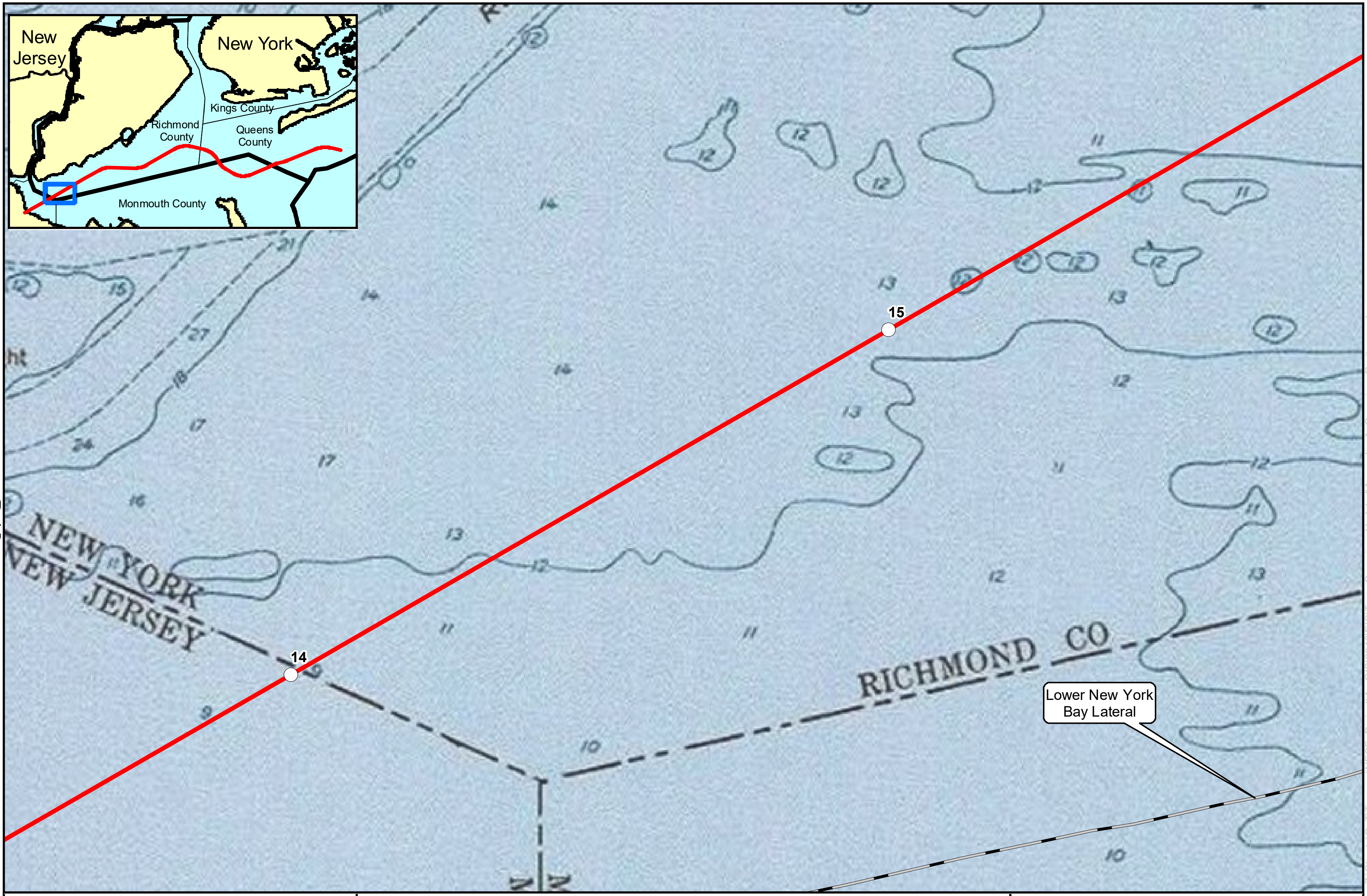

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York and Middesex County, New Jersey

Page 14 of 28

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

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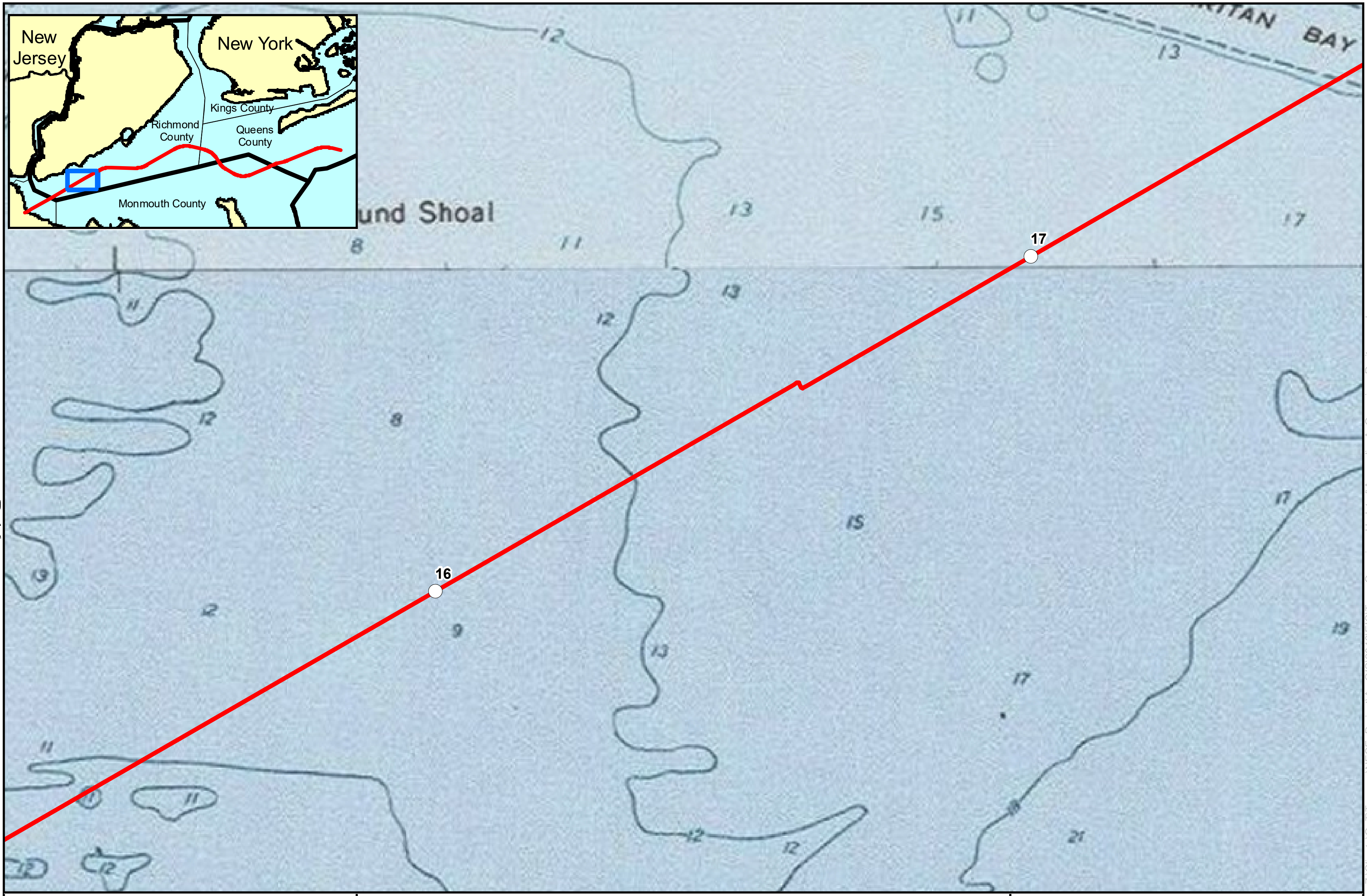

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

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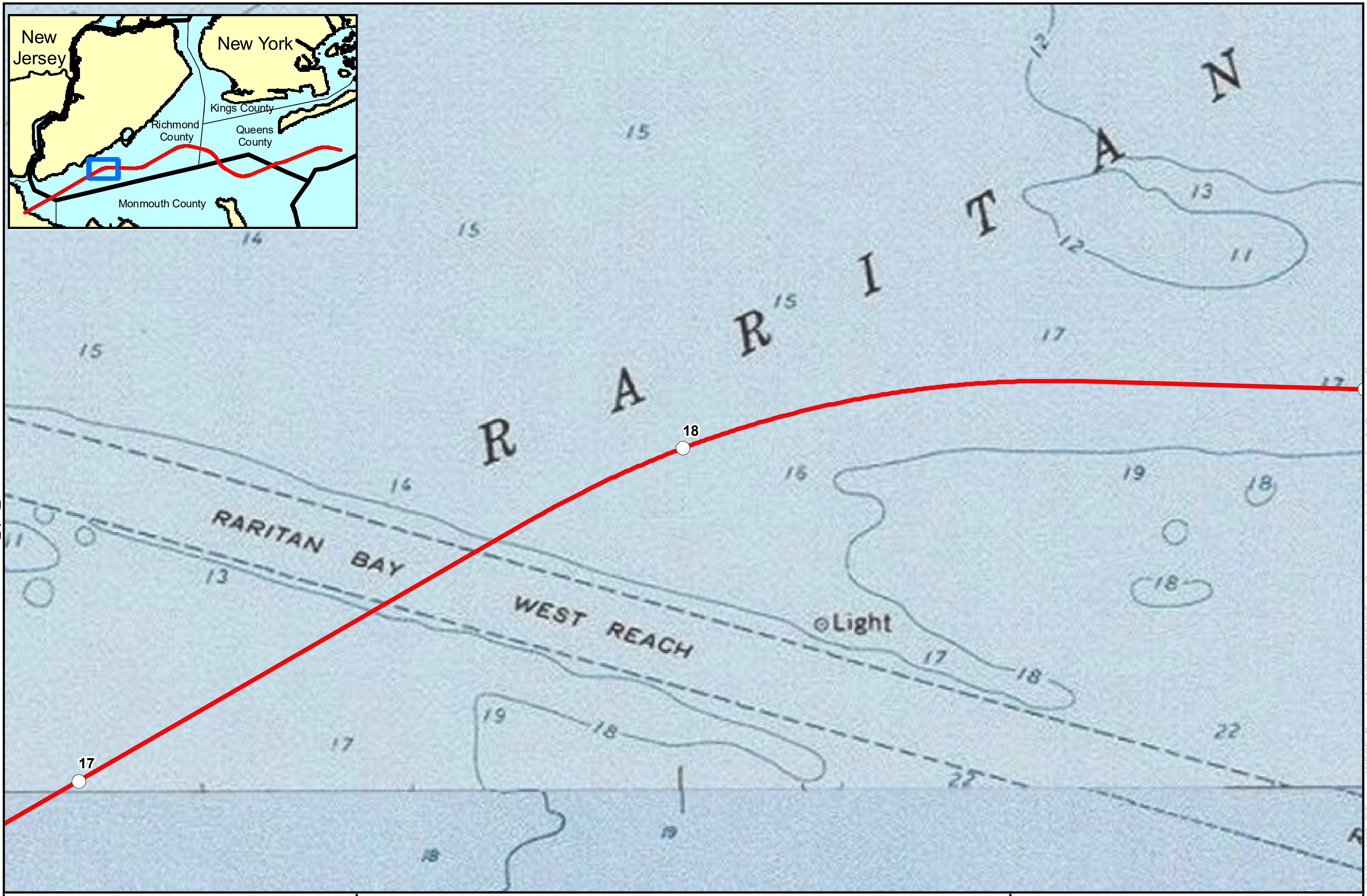

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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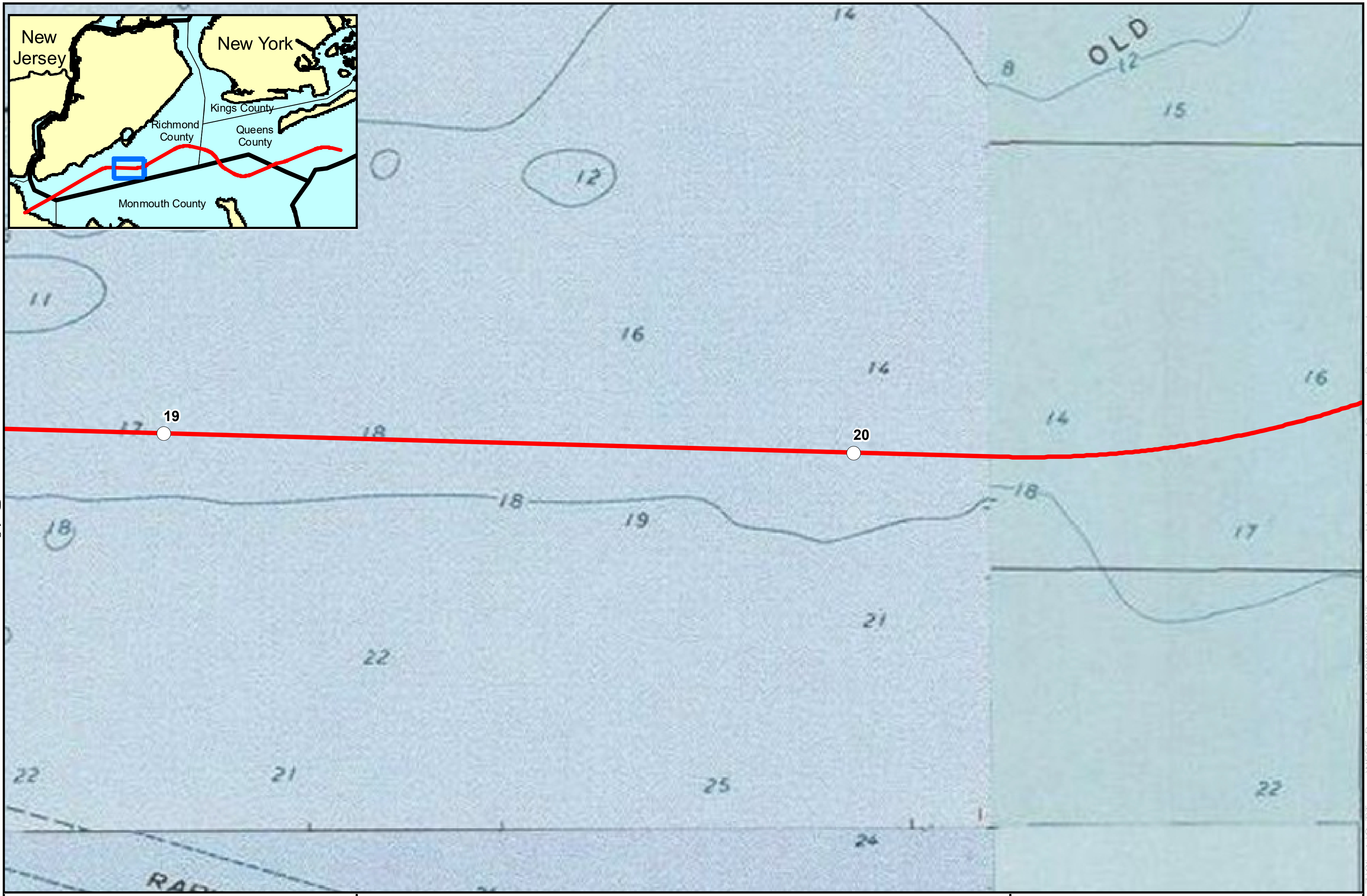

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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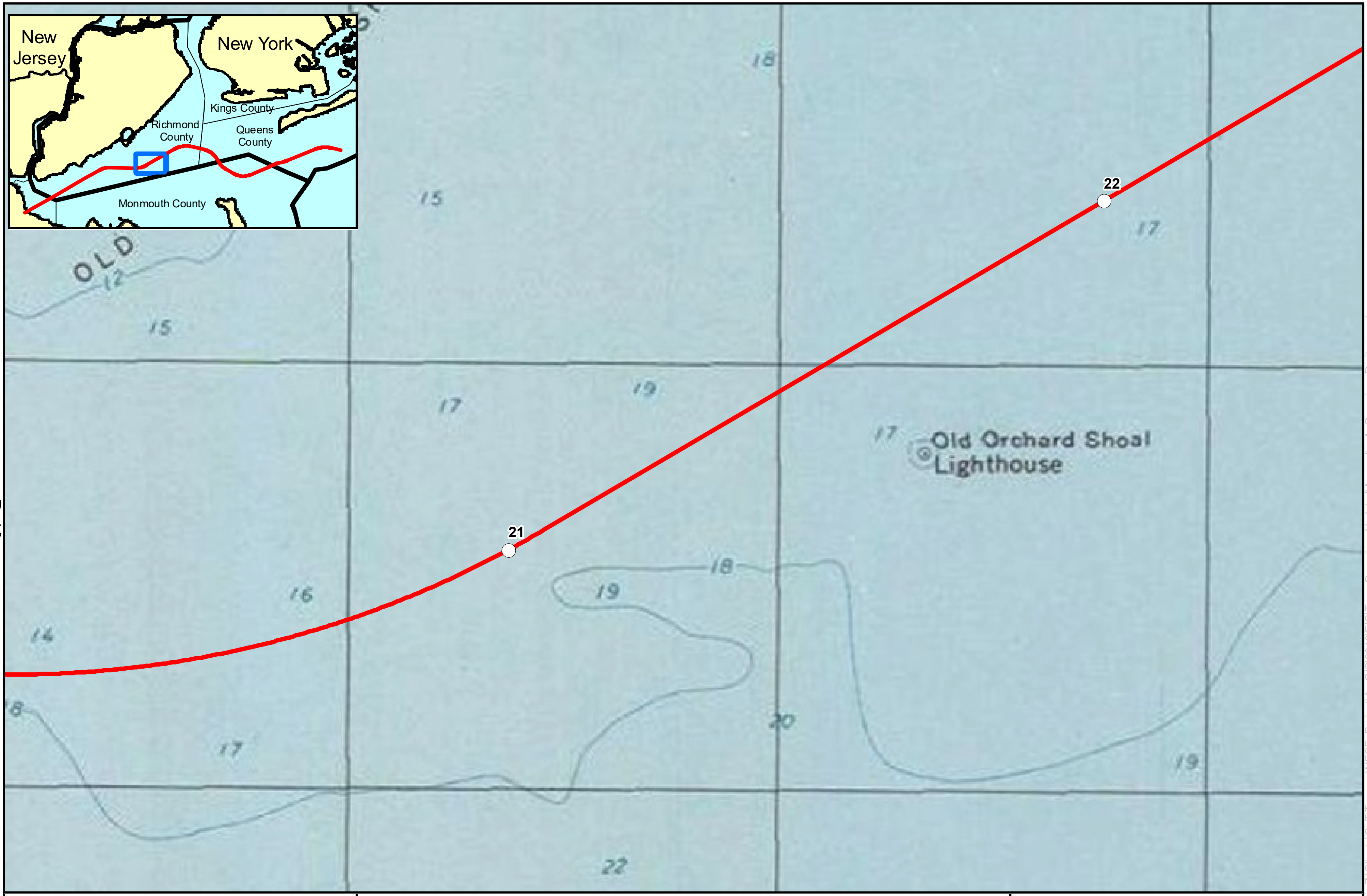

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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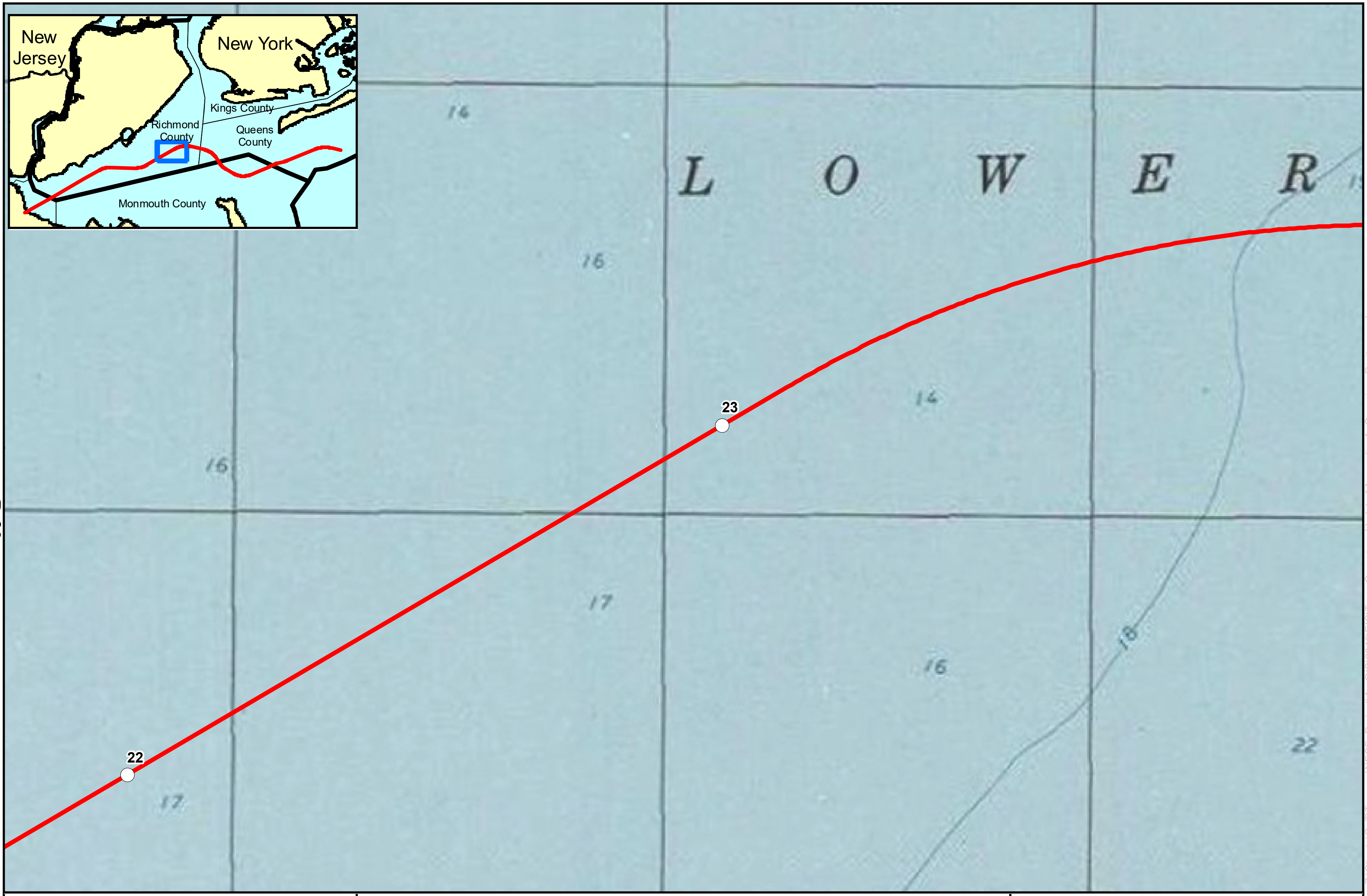

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

For Environmental Review Purposes Only

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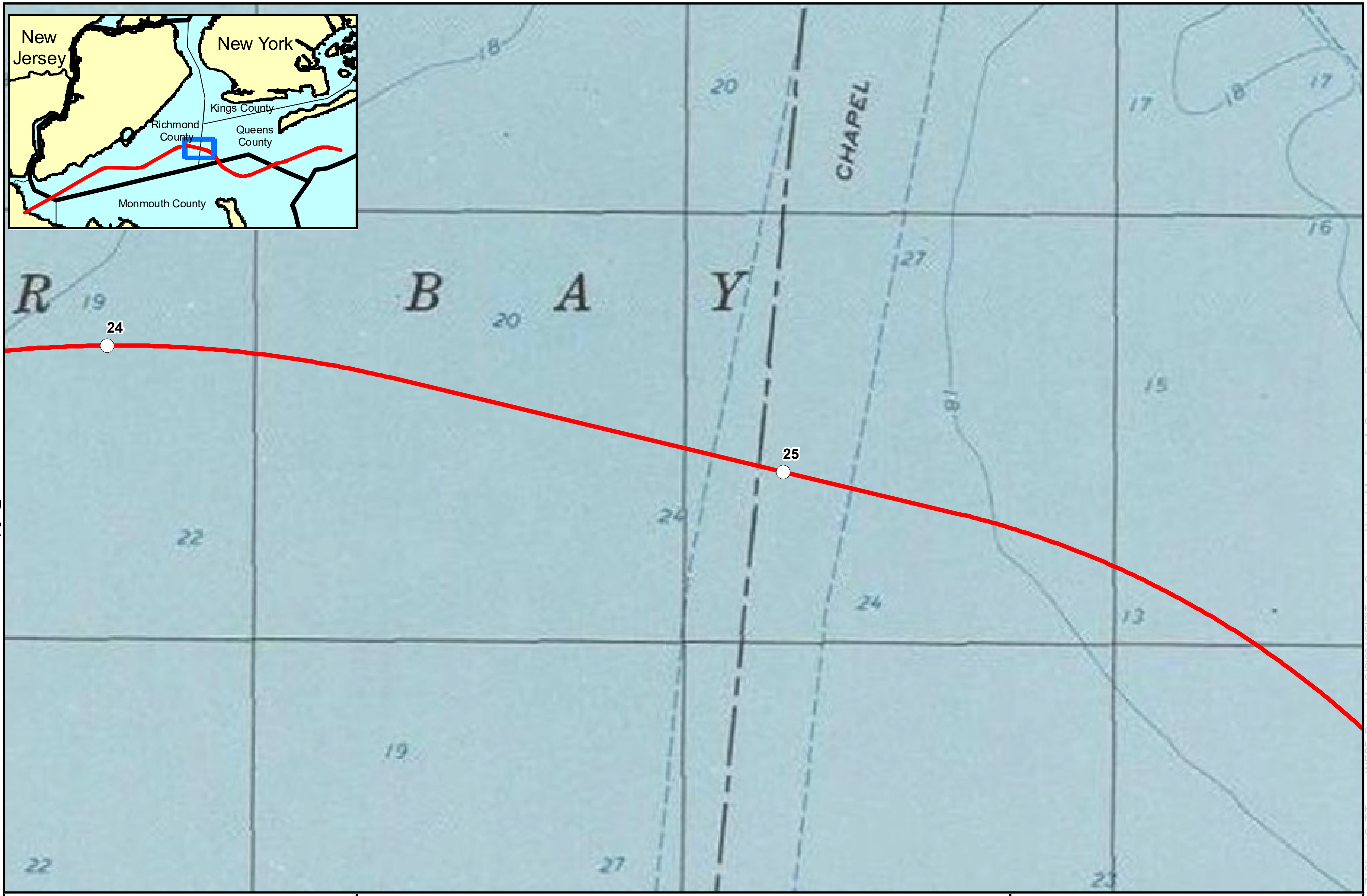

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Richmond County and Queens County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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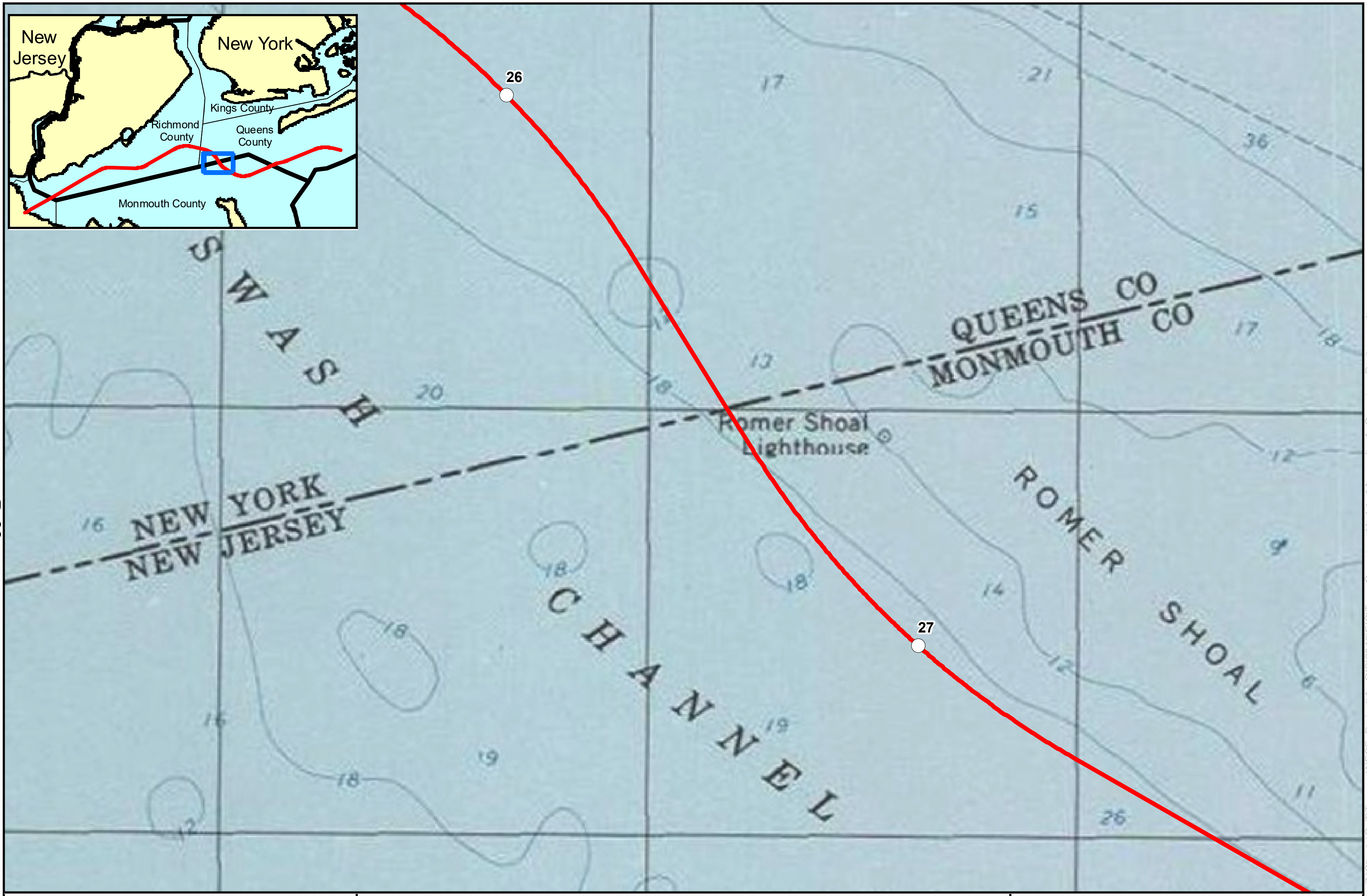

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Queens County, New York and Monmouth County, New Jersey

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

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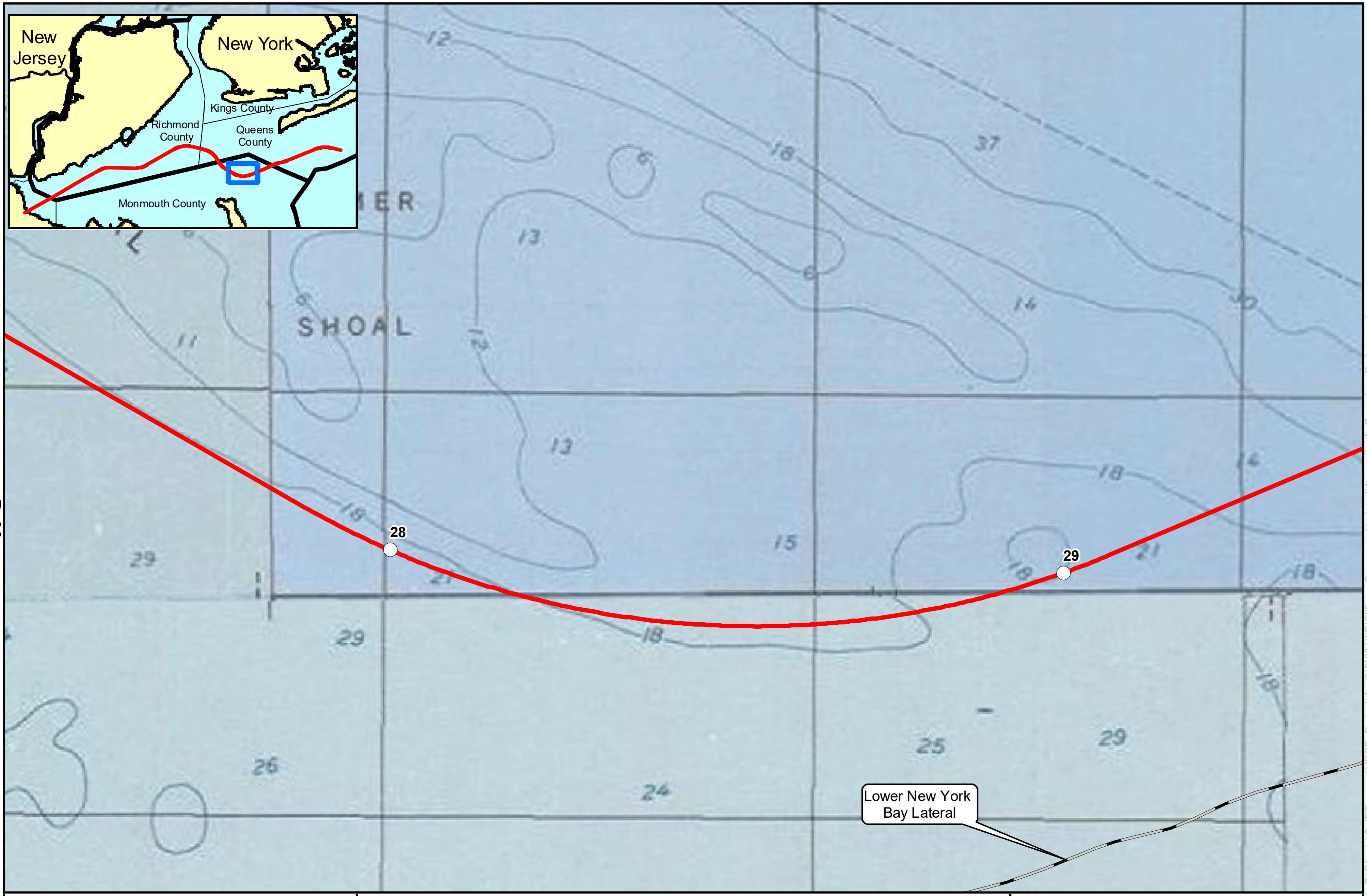

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Monmouth County, New Jersey

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

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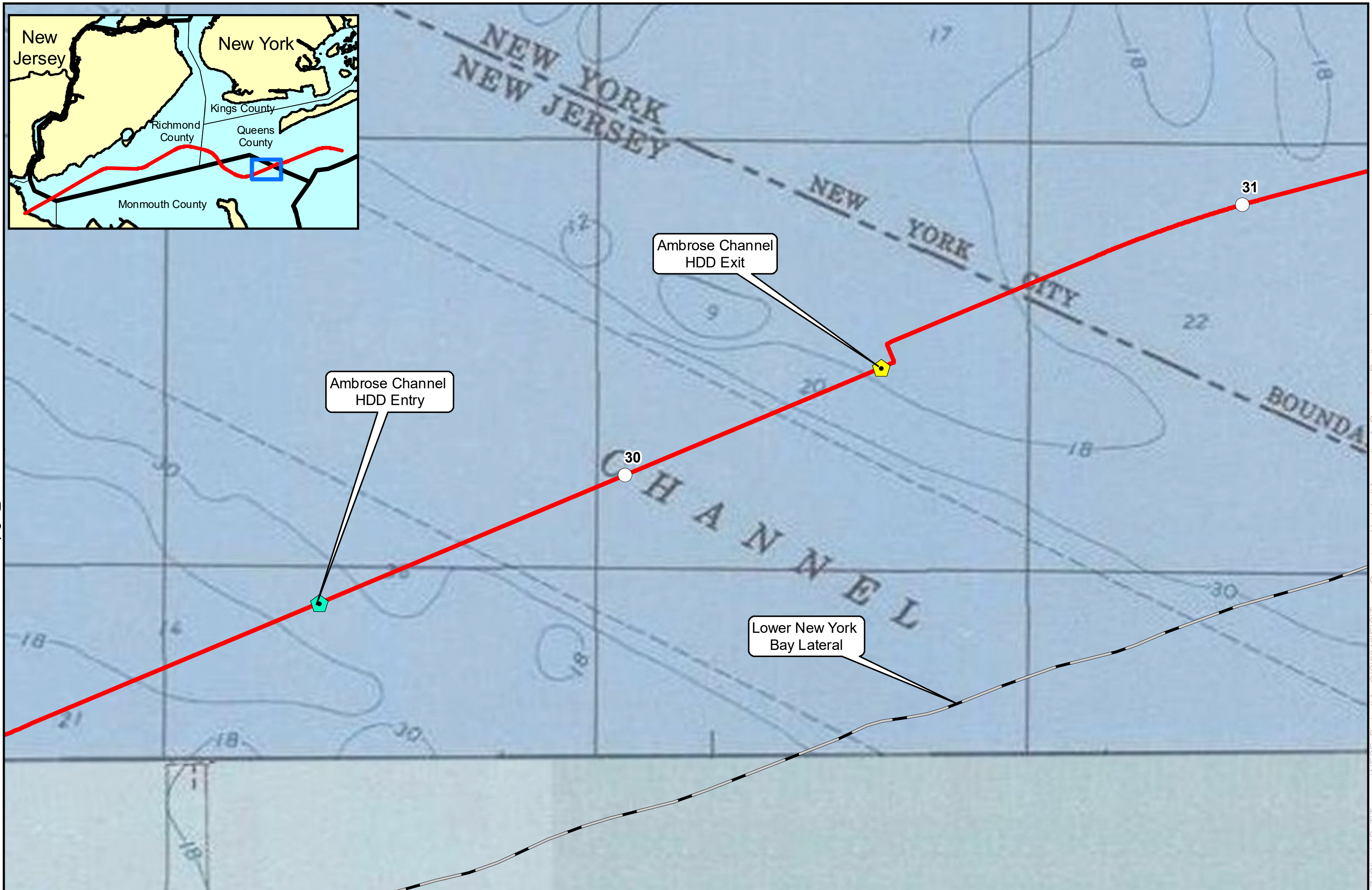

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Monmouth County, New Jersey and Queens County, New York

- Existing Transco Pipeline
- Proposed Raritan Bay Loop
- Milepost
- Cathodic Protection System
- HDD Entry
- HDD Exit
- Morgan M&R Station

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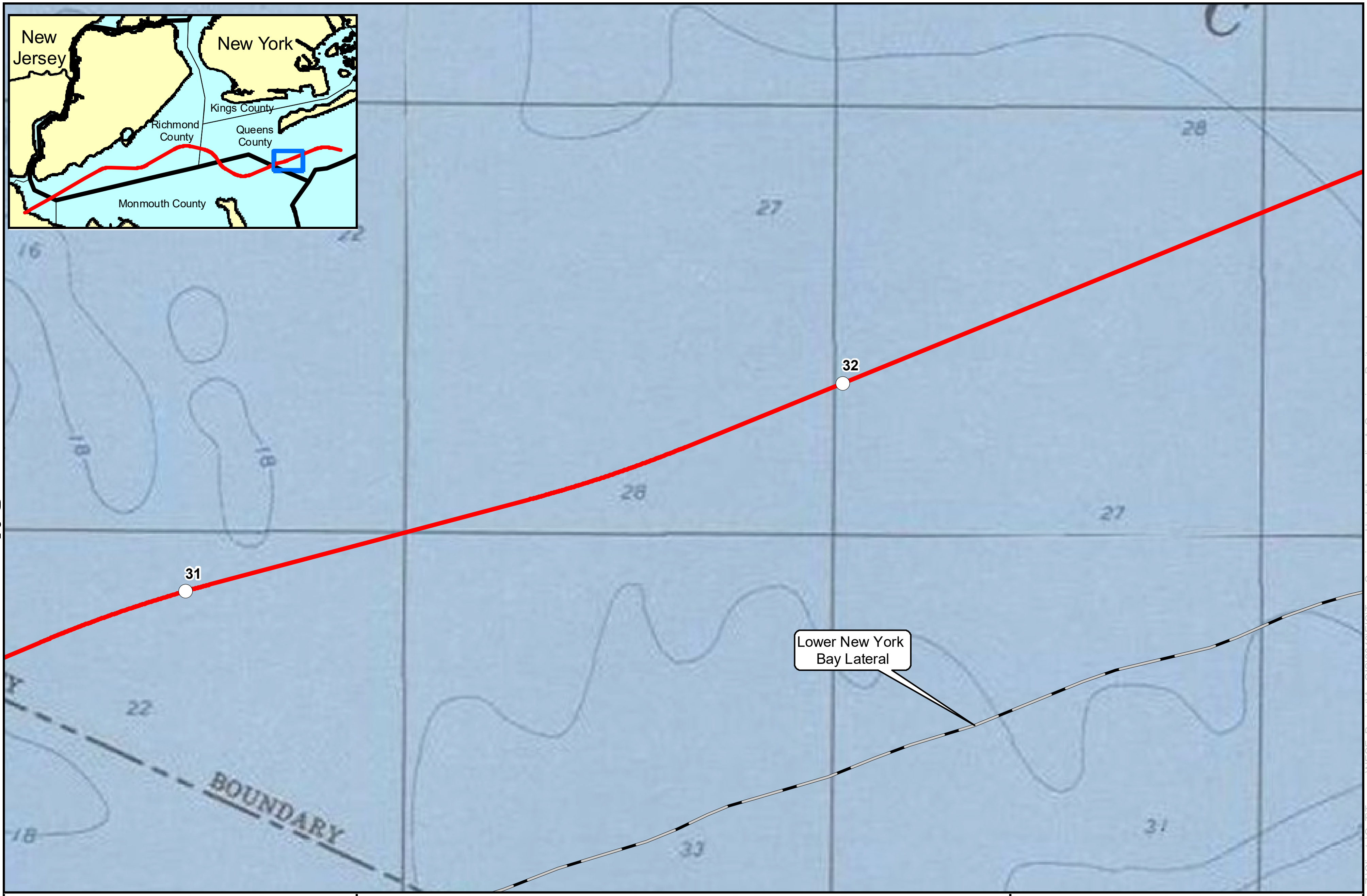

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Monmouth County, New Jersey and Queens County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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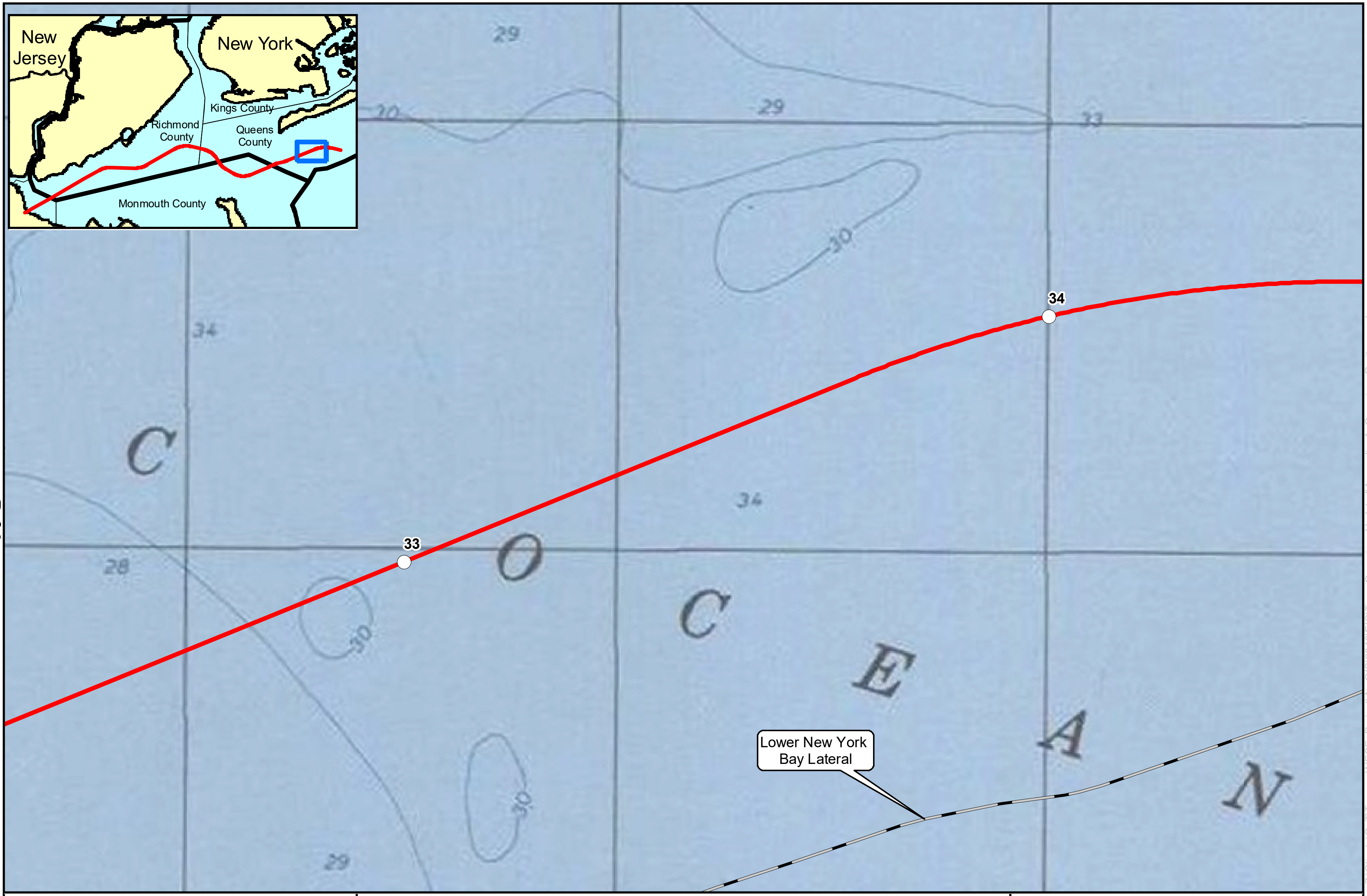

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Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Queens County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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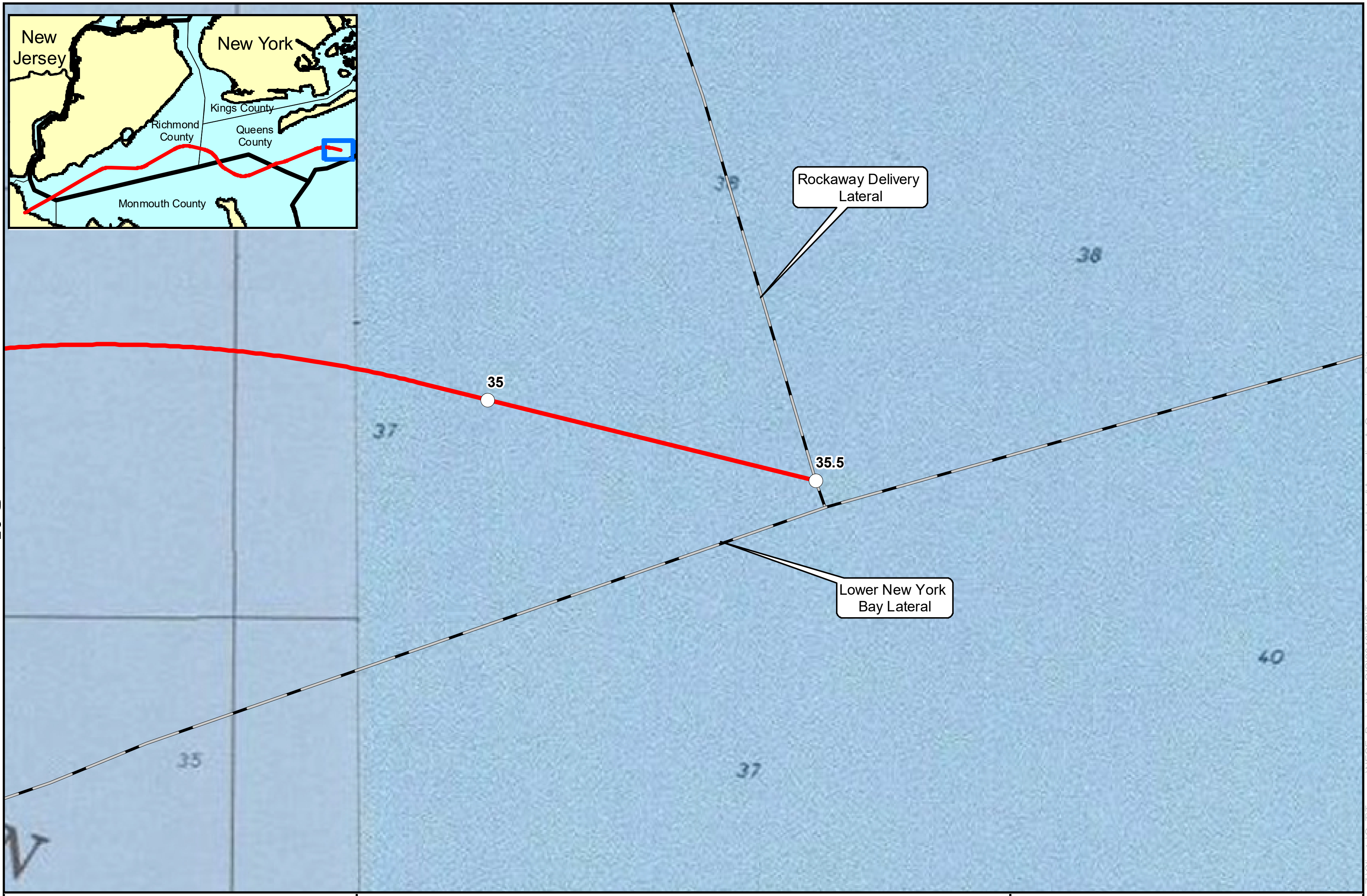

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Queens County, New York

Existing Transco Pipeline
Proposed Raritan Bay Loop
Milepost
Cathodic Protection System
HDD Entry
HDD Exit
Morgan M&R Station

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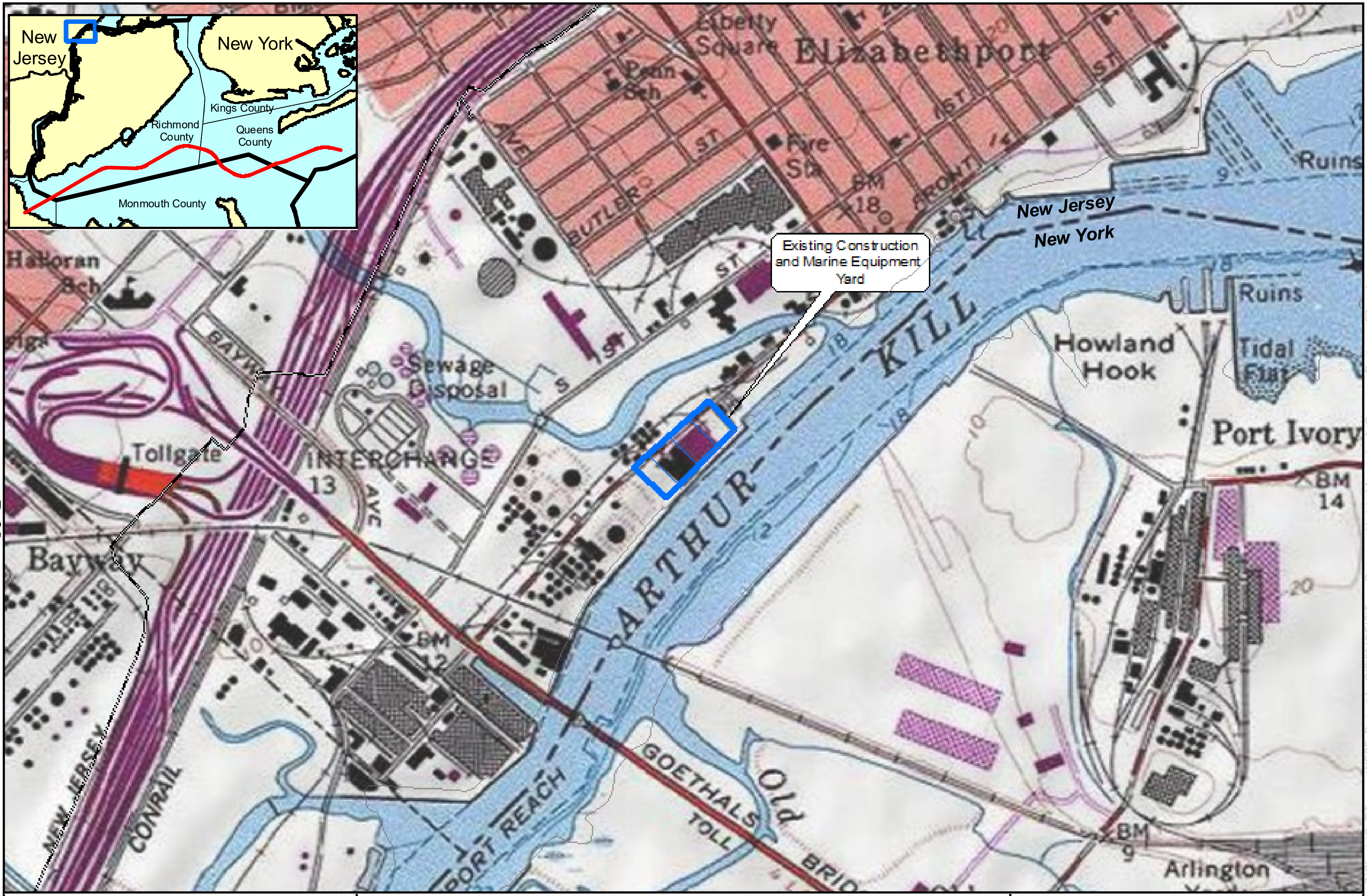

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Union County, New Jersey

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Contractor Yard

For Environmental Review Purposes Only

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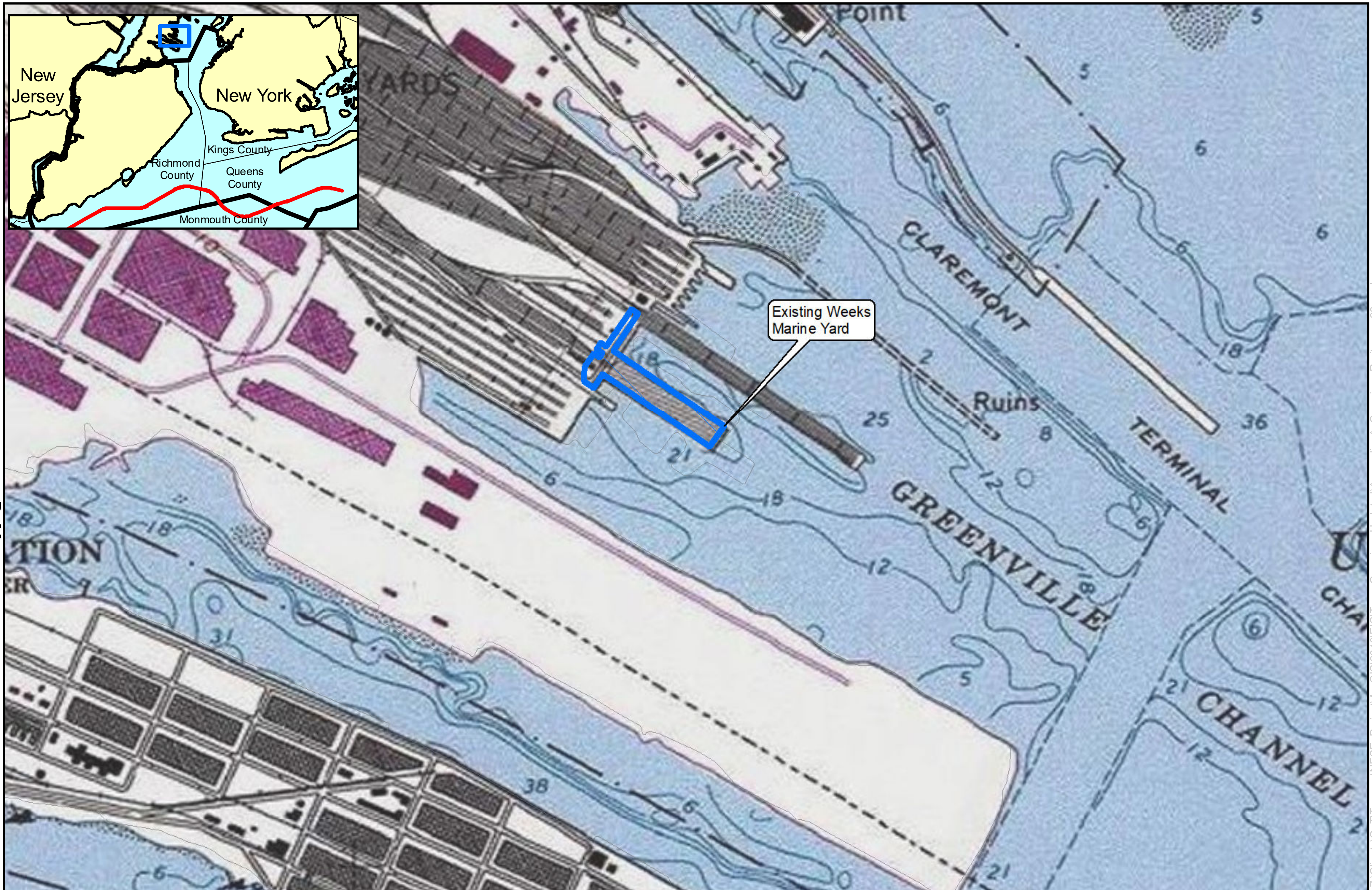

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For Environmental Review Purposes Only

Appendix B
Northeast Supply Enhancement Project
Raritan Bay Loop
Hudson County, New Jersey

Contractor Yard

Source: Z:\Clients\Q_T\Transco\NESE_Project\ArcGIS\2018\EIS\Topo_Overview_Updated\Appendix_A_Overview_Raritan_pg28.mxd

Date: (8/27/2018)