TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT

COMPRESSOR STATION 206
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NJ

MADISON & RARITAN BAY LOOPS
OLD BRIDGE TOWNSHIP AND SAYREVILLE BOROUGH, MIDDLESEX COUNTY, NJ

APPLICATION FOR

FRESHWATER WETLANDS INDIVIDUAL PERMIT, COASTAL WETLANDS INDIVIDUAL PERMIT, WATERFRONT DEVELOPMENT PERMIT, FLOOD HAZARD AREA INDIVIDUAL PERMIT AND WATER QUALITY CERTIFICATE

ENVIRONMENTAL REPORT

Submitted to:

New Jersey Department of Environmental Protection
Watershed & Land Management
Division of Land Resource Protection

Submitted by:

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NOVEMBER 2026

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PART I. INTRODUCTION

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of Williams Partners L.P. (Williams), is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters. The purpose of the Project remains consistent with the 2020 applications – to provide 400,000 dekatherms per day of incremental firm transportation capacity from Transco's Station 195 in York County, Pennsylvania, to the existing Rockaway Delivery Point (located approximately three miles offshore of the Rockaway Peninsula in Queens Borough, New York) to serve The Brooklyn Union Gas Company, d/b/a National Grid NY, and KeySpan Gas East Corporation, d/b/a National Grid (collectively, National Grid or Project Shippers).

Transco is submitting this application for the construction of Compressor Station 206 in Franklin Township, Somerset County, New Jersey, pipeline facilities known as Madison Loop and Raritan Bay Loops (onshore and offshore) in Old Bridge Township and Sayreville Borough, Middlesex County. The Project is known as Northeast Supply Enhancement (NESE).

This Environmental Report provides detailed information regarding the Project including project location, proposed activities, existing conditions and proposed impacts. Proposed construction activities are shown on the Freshwater Wetland Plans, Waterfront Development Plans and Flood Hazard Area Plans.

Under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A), the New Jersey Department of Environmental Protection (NJDEP) Division of Land Resource Protection (DLRP) regulates activities within freshwater wetlands, transition areas and State open waters. Proposed activities that do not meet the requirements of an authorization under a general permit-by-certification, an authorization under a general permit, or a transition area waiver will require authorization under a Freshwater Wetlands Individual Permit pursuant to N.J.A.C. 7:7A-9.

The NJDEP DLRP regulates the use and development of coastal resources though the Coastal Area Facility Review Act of 1973 (CAFRA) (N.J.S.A. 13:19-1 et seq.), the Wetlands Act of 1970 (N.J.S.A. 13:9A-1 et seq.), the Waterfront Development Law (N.J.S.A. 12:5-1 et seq.) and the Coastal Zone Management Rules (N.J.A.C. 7:7). The Project is located outside of the geographic regulatory limits of CAFRA.

The Wetlands Act of 1970 regulates the draining, dredging, excavation, or deposition of material, and the erection of any structure, driving of pilings or placing of obstructions in any coastal wetlands that have been mapped or delineated pursuant to the Coastal Wetlands Act of 1970. Areas identified as the Upper Wetlands Boundary (UWB) by the NJDEP, Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS) (2002) were delineated under the Wetlands Act of 1970 (N.J.S.A. 13:9A-1 et seq). Impacts to mapped coastal wetlands are proposed as part of this Project. The project will comply with various coastal zone management policies defined in the Rules on Coastal Zone Management (N.J.A.C. 7:7).

Through the authority of the Waterfront Development Act, the NJDEP regulates development in the waterfront area. Pursuant to N.J.A.C. 7:7-2.4, for areas located outside of the CAFRA zone the NJDEP regulates the following areas:

- All tidal waterways and all lands lying thereunder up to and including the mean high-water line.
- Adjacent upland areas within 100 feet of the mean high-water line. For properties within 100 feet of the mean high-water line that extend beyond 100 feet, the regulated waterfront area extends inland to the following:
- 500 feet from the mean high-water line; or
- The first paved public road, railroad or property line that existed in September 1980.

Portions of the Project area are located within 500 feet of the mean high-water line and therefore regulated by the Waterfront Development Act. The Project will comply with various coastal zone management policies defined in the Coastal Zone Management Rules (N.J.A.C. 7:7).

The Flood Hazard Area Control Act Rules (N.J.A.C. 7:13) set standards for the development within flood hazard area and riparian zones. Flood Hazard Area regulations govern human disturbance to the land and vegetation in flood hazard areas of a regulated water and riparian zone of a regulated water. No person shall engage in a regulated activity within a regulated area without a flood hazard area authorization of permit as required by N.J.A.C. 7:13 or a coastal permit as required by N.J.A.C. 7:7. Portions of the proposed Madison Loop and Raritan Bay Loop, which are subject to the Rule on Coastal Zone Management Rules (pursuant to NJ Waterfront Development Law), do not require authorization of a Flood Hazard Area Permit, However, the Applicant is required to demonstrate compliance with the Flood Hazard Area Control Act Rules as part of the Waterfront Development Permit application. For all other areas, impacts to flood hazard areas will require authorization under a Flood Hazard Area Individual permit. In addition, Transco is requesting verification of the flood hazard area for the Compressor Station 206 property.

Transco is applying to the NJDEP DLRP for the following permit approvals, authorizations and certification for activities associated with the NESE Project.

- **Freshwater Wetlands Individual Permit;**
- **Coastal Wetlands Individual Permit;**
- **Waterfront Development Individual Permit,**
- **Flood Hazard Area Individual Permit with Verification;**
- **Water Quality Certificate.**

The **Compliance Statement** (submitted under separate cover) demonstrates the Project's compliance with the Freshwater Wetlands Protection Act Rules for the Freshwater Wetlands Individual Permit; Coastal Zone Management Rules for the Coastal Wetlands Individual Permit and Waterfront Development Individual Permit and Flood Hazard Area Control Act Rules for the Flood Hazard Individual Permit.

PART II. PROJECT HISTORY

A summary of the Project's NJDEP Administrative History is provided below[1]. Previous correspondence with the agencies is provided in **Appendix A**.

- **March 27, 2017,** Transco applied to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity (Certificate) pursuant to the Natural Gas Act for approval of the NESE Project.
- **July 26, 2017,** Transco submitted an initial application to NJDEP for a Freshwater Wetlands Individual Permit, Flood Hazard Area Individual Permit, Flood Hazard Verification, Waterfront Development In-Water Individual Permit, Waterfront Development Upland Individual Permit, and a Coastal Wetlands Individual Permit (DLUR File No. 0000-01-1001.3; FWW170001, FHA170001, FHA170002, WFD170001, WFD170002, and CSW170001) for the NESE Project.
- **June 15, 2018,** Transco withdrew the application due to technical deficiencies.
- **June 20, 2018,** DLUR received the resubmission of the application for NESE Project for a Freshwater Wetlands Individual Permit, Flood Hazard Area Individual Permit, Flood Hazard Verification, Waterfront Development In-Water Individual Permit, Waterfront Development Upland Individual Permit, and a Coastal Wetlands Individual Permit (DLUR File No. 0000-01-1001.3; FWW180001, FHA180001, FHA180002, WF180001, WFD180002, and CSW180001).
- **July 18, 2018,** the DLUR issued a deficiency letter, which informed Transco that among other deficiencies, its application did not include property owner consent to access work and construction areas outside the existing Transco Right of Way, failed to address stormwater management issues at the proposed compressor station, and did not include approval from the United States Army Corps of Engineers (USACE) for Transco to dispose of dredge materials within the Historic Area Remediation Site (HARS) or any another suitable proposed upland disposal facility.
- **September 4, 2018,** Transco submitted a response package to the July 18, 2018 deficiency letter. Information included updates to property owner certification, stormwater information, and dredge plan and spoils disposal information.
- **September 14, 2018,** DLUR issued a second deficiency letter after determining the information submitted on September 4, 2018 was not complete.
- **September 26, 2018,** Transco submitted a response package to the September 14, 2018 deficiency letter. Transco's response included the necessary property owner consents for all outstanding properties and an updated Sediment Sampling and Analysis Plan for the proposed Raritan Bay Loop.
- **September 27, 2018** DLUR issued a third deficiency letter advising Transco that although the Sediment Sampling and Analysis Plan was sufficient for dredge sampling to begin the application remained deficient until the results have been analyzed and a letter was provided from an upland dredge material disposal facility indicating that both storage and chemical composition was acceptable. The September 27 letter also identified outstanding stormwater deficiencies.
- **November 5, 2018,** NJDEP held a public hearing in Franklin Township for the freshwater wetland components of proposed Compressor Station 206 and the Madison Loop. The public comment period for the public hearing was from November 5 through November 20.
- **November 8, 2018,** DLUR requested that Transco provide an analysis of a potential alternative access road into CS 206 from the SUNCO utility right of way to determine if such an alternative would reduce or avoid

1 NJDEP. May 15, 2020. Denial of an Application for a Freshwater Wetlands Individual Permit, Flood Hazard Area Individual Permit, Waterfront In-Water Individual Permit, Waterfront Upland Individual Permit, Coastal Wetlands Individual Permit and Water Quality Certificate. DLUR File No.: 0000-01-1001.3; LUP 200001

impacts to wetlands. Transco provided responses on November 30, supplemental information on December 12, 2018, and follow up responses related to the access road width on December 21, 2018. The follow up information indicated that the SUNCO alternative would not reduce or avoid wetlands impacts.

- **February 6, 2019,** Transco provided information consisting of revisions and supplemental information for the CS 206 infiltration basin, results of pre-dredging sampling and analysis, and the acceptance letter from an upland dredge material disposal facility. The NESE Project application was declared complete for review February 6, 2019. The 90-day review period pursuant to the Coastal Zone Management Rules and the Flood Hazard Area Control Act Rules was set to end May 6, 2019.
- **March 18, 2019,** NJDEP held a public hearing in East Brunswick Township for the Waterfront Development, Coastal Wetland and Flood Hazard Area Permits and a pending Division of Water Allocation permit application for temporary dewatering activities for the NESE Project. The public comment period for the public hearing was from March 18 through April 2, but was subsequently extended to April 17, 2019, to allow the public additional time to provide comments on the Waterfront Development, Coastal Wetland and Flood Hazard Area Permits for the NESE Project.
- **March 20, 2019,** DLUR requested additional information from Transco regarding HDD failure contingency plans and proposed work in the Raritan Bay Superfund Slag Site resulting from comments received during the public hearing. Transco provided an HDD contingency plan memo on March 27, 2019.
- **March 20, 2019,** DLUR asked Transco to revise the Madison Loop site plans to reflect that there were no exceptional resource value wetlands west of Gondek Drive.
- **April 28, 2019,** Transco submitted revised plan sheets depicting March 20, 2029 requested changes.
- **March 25, 2019,** DLUR received an email from Eastern Environmental Law Center concerning the sighting of a Barred Owl adjacent to the proposed CS 206 site by a local resident.
- **April 4, 2019,** DLUR's Threatened and Endangered Species Unit conducted a site visit at the CS 206 site location to determine the suitability for Barred Owl habitat.
- **April 5, 2019,** DLUR in consultation with Transco agreed to extend the 90-day review period for 30 days. The review period ends June 5, 2019. The public comment period was extended an additional 15 days to May 2, 2019.
- **April 11, 2019,** DLUR asked Transco to revise the CS 206 site plans to account for the anticipated exceptional resource value wetland reclassification and update the freshwater wetland compliance report and alternative analysis to account for the Barred Owl habitat evaluation.
- **May 1, 2019,** Transco provided revisions to the environmental report to address N.J.A.C. 7:7A-10.3 and 10.4 and DLUR received site plan revisions on May 2, 2019.
- **May 17, 2019,** DLUR received further revisions to the CS 206 site plans to reflect the modified buffer and changes to the Stormwater Detention Basin.
- **April 29, 2019,** the Barred Owl sighting record was accepted as valid by the NJDEP Division of Fish and Wildlife, Endangered and Non-Game Species Program. At that time, the forested wetlands surrounding the CS 206 site were determined to be suitable habitat for Barred Owl and therefore, the wetlands surrounding the CS 206 were reclassified as exceptional resource value with a 150-foot buffer.
- **June 5, 2019,** DLUR denied the FWW IP, WFD In-Water IP, WFD Upland IP, Coastal Wetlands IP and FHA IP applications (DLUR file no.: 0000-01-1001.3; FWW180001, FHA180001, CSW180001, WFD180001, WFD 180002) indicating that Transco had not adequately demonstrated alternatives for the CS206, the detention basin, the access roadway to CS206 as required under N.J.A.C. 7:7A-10.2 and 10.3, the compelling public need requirements at N.J.A.C. 7:7A-10.4(a)1, the riparian zone requirements at N.J.A.C. 7:13-11.2 and the dredging requirements at N.J.A.C. 7:7-12.7.

- **June 12, 2019,** Transco resubmitted the application for the NESE Project for an FWW IP, WFD IP In-Water, WFD IP Upland, Coastal Wetlands IP, and FHA IP (DLUR File No. 0000-01-1001.3; LUP 190001 and 190002).
- **June 17, 2019,** a tidelands utility license application was submitted to the NJDEP, Bureau of Tidelands.
- **June 21, 2019,** DLUR issued an administrative deficiency letter regarding the application fee.
- **June 25, 2019,** DLUR issued a technical deficiency letter for the NESE Project. In the technical deficiency letter, DLUR requested a modeling analysis for any parameters that exceeded ER-M values for saline water sediments; revised plans showing the access road to the compressor station, and suction and discharge piping tie-in located outside any exceptional resource value transition areas; submission of items identified in the June 20, 2019 email from the DLUR's Dredging Unit to Transco; additional alternatives for the compressor station access roadway, including access through Higgins Farm and eminent domain and condemnation; and additional information on the compelling public need of the NESE Project.
- **June 28, 2019,** Transco submitted supplemental information addressing the June 21, 2019 and June 25, 2019 deficiency letters.
- **July 12, 2019,** DLUR issued a complete for review letter for the WFD In-Water IP, WFD Upland IP and Coastal Wetlands IP applications (LUP 190002), and a technical deficiency letter for the FHA IP and FWW IP applications (LUP 190001). The DEP's 90-day decision deadline for the WFD In-Water IP, WFD Upland IP and Coastal Wetlands IP permit was September 25, 2019.
- **August 1, 2019,** Transco submitted FHA (LUP 190001) information for review.
- **August 16, 2019,** Transco submitted FWW information for review.
- **August 26, 2019,** DLUR emailed Transco indicating that the FHA application was complete for review and the 90-day deadline for permit issuance is October 25, 2019. Additionally, the FWW IP (LUP 190001) was also complete for review, but there was no statutory review for the FWW IP application.
- **September 16, 2019,** Transco requested a 30-day extension of the review period for the WFD Upland IP, WFD In-Water IP and Coastal Wetlands IP (LUP 190002). The 120th day decision deadline was October 25, 2019.
- **October 25, 2019,** Transco requested a 30-day extension of the review period for the FHA application. The 120th day decision deadline was November 28, 2019.
- **October 25, 2019,** the WFD Upland IP, WFD In-Water IP and Coastal Wetlands IP (LUP 190002) the applications were subsequently withdrawn.
- **October 28, 2019,** Transco re-submitted an application for a WFD In-Water IP, WFD Upland IP, and Coastal Wetlands IP (LUP 190003). The 90th day decision deadline is January 25, 2019.
- **November 27, 2019,** the application for the WFD In-water and Upland Individual Permits, Freshwater Wetlands Individual Permit, Coastal Wetland Permit and Flood Hazard Area Permit was withdrawn.
- **January 21, 2020,** Transco resubmitted an application for all the previously requested permits as well as a Flood Hazard Verification.
- **February 5, 2020,** the NJDEP made a request for additional administrative information.
- **February 7, 2020,** Transco submitted the requested administrative information, and the application was declared complete for review. The 90-day deadline for rendering a decision on the application was determined to be May 6, 2020.
- **February 20, 2020,** The NJDEP February 19, 2020 bulletin was published, which provided public notice of the application. The start of public comment period therefore was February 20, 2020.
- **February 23, 2020,** National Grid, the planned recipient of the additional natural gas conveyed by the Project, released its Natural Gas Long-Term Capacity Report for Brooklyn, Queens, Staten Island, and Long Island, which evaluated the public need for the Project.

- **April 6, 2020,** the 45-day public comment period ended.
- **April 7, 2020,** Transco requested, and NJDEP agreed to a 30-day extension to the 90-day deadline.
- **April 8, 2020,** Transco withdrew a requested Flood Hazard Area (FHA) Verification because it was not required because there are no above ground structures in any flood hazard area.
- **April 15, 2020,** the NJDEP published in the DEP Bulletin that the public comment period would be extended for an additional 30 days.
- **May 7, 2020,** the NJDEP extended public comment period ended.
- **May 8, 2020,** National Grid issued the Supplemental Report Natural Gas Long-Term Capacity Report for Brooklyn, Queens, Staten Island, and Long Island, which evaluated the public need for the Project.
- **May 15, 2020,** the New York State Department of Environmental Conservation denied the necessary approvals for the Project.
- **May 15, 2020,** the NJDEP denied Transco's WFD In-water and Upland Individual Permits, Freshwater Wetlands Individual Permit, Coastal Wetland Permit and Flood Hazard Area Permit due to failure to demonstrate a compelling public need for the Project.
- **January 20, 2025,** issuance of the President's Executive Orders, *Declaring a National Energy Emergency* and *Unleashing American Energy*.
- **May 23, 2025,** Transco submitted a new tidelands utility license application to the NJDEP Bureau of Tidelands.
- **May 30, 2025,** Transco submitted an application for a Coastal Wetland Permit, WFD In-Water Individual Permit, WFD Upland Individual Permit, FHA Verification – Method 5, FHA Individual Permit – Utility, and Water Quality Certificate to the NJDEP for review and approval.
- **June 23, 2025,** the NJDEP determined the application was Administratively Complete.
- **July 21, 2025,** DLUR issued a technical deficiency letter for the NESE Project.
- August 6, 2025, NJDEP publishes notice of public hearing (scheduled for September 10, 2025) in the DEP Bulletin.
- **August 21, 2025,** Transco submitted supplemental information addressing the July 21, 2015 deficiency letter.
- **September 10, 2025,** the NJDEP held a virtual public hearing for the Project. Public comment period scheduled to close September 25, 2025.
- **November 7, 2025,** the NJDEP issued a Coastal Wetland Permit, WFD In-Water Individual Permit, WFD Upland Individual Permit, FHA Verification – Method 5, FHA Individual Permit – Utility, and Water Quality Certificate (Permit # 0000-25-0012.1 LUP250001) for the Project.
- **May 3, 2026,** the Tidelands **Resource Council** voted to approve the Tidelands License for the Project.
- **July 17, 2026,** the NJDEP Bureau of Tidelands Management issued the Tidelands License (#1219-25-0004.1 TDI250001) for the Project.
- **September 8, 2026,** the U.S. Court of Appeals for the Third Circuit vacated the Water Quality Certificate and remanded the matter back to the NJDEP for further proceedings consistent with its opinion.

Transco is reviving the Project at the request of the federal administration and in consideration of the President's Executive Orders, *Declaring a National Energy Emergency* and *Unleashing American Energy,* issued on January 20, 2025. These Executive Orders make clear that infrastructure development, particularly in the Northeastern United States, is desperately needed. Transco's Project will enhance reliability, flexibility, and efficiency on a critical part of Transco's system and provide access to crucial supplies of natural gas. As recently highlighted in the Northeast Power Coordinating Council's *Northeast Gas/Electric System Study*, existing gas infrastructure in New York is unable to meet the demand for most electric generators during a cold snap.[2] While many generators in downstate New York—where the Project is

2 Northeast Power Coordinating Council, *Northeast Gas/Electric System Study*, at 5 (Jan. 21, 2025).

intended to serve—are dual-fuel capable, very few electric generators have firm transportation entitlements, exposing electric generation to risk in the event of an extreme weather event or a pipeline outage.[3]

The status of other state and federal permits potentially relevant to the subject NJDEP permit application include the following:

- On August 28, 2025, the Federal Energy Regulatory Commission (FERC) reissued of the Certificate of Public Convenience and Necessity (Certificate; Docket Nos. CP17-101-007 and CP20-49-001) under Section 7(c) of the Natural Gas Act authorizing Transco to construct and operate the NESE Project. The August 2025 Order Issuing Certificate incorporated by reference FERC's original Certificate for the Project that was issued on May 3, 2019, as amended.
- On August 31, 2025, the New York State Department of State (NYSDOS) issued Concurrence with Consistency Certification (File Nos. F-2017-0612 and F-2025-0349) for Project activities in New York
- On November 7, 2025, the New York State Department of Environmental Conservation (NYSDEC) issued a final Water Quality Certification (Permit ID 2-9902-00109/00009) under Section 401 of the Clean Water Act Project activities in New York.
- On December 10, 2025, the U.S. Army Corps of Engineers (USACE) issued a final combined permit (Permit No. NAN-2016-00908) under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research and Sanctuaries Act for Project activities in New Jersey and New York.

3 *Id.* at 5-6.

PART III. PROJECT DESCRIPTION

1.0 PROJECT LOCATION

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of Williams Partners L.P. (Williams), is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters (the North East Supply Enhancement Project (NESE)) (**Figure 1**). Within New Jersey, the Project includes four distinct sections (**Figure 2)**:

- Compressor Station 206 – a new compressor station located within Block 5.02 Lot 25 and portions of Lots 1.02, 23 and 26.01 within Franklin Township, Somerset County. The Compressor Station centers on approximately a northing 465,181.780 and easting of 573,010.577 New Jersey State Plane Feet.
- Madison Loop – approximately 3.43 miles of new pipeline between existing Compressor Station 207 located off Old Water Works Road in Old Bridge Township, Middlesex County and a point southwest of the Morgan meter and regulating (M&R) Station located near the intersection of Old Spye Road and 1st Street in the Borough of Sayreville, Middlesex County.
- Raritan Bay Loop (onshore) – approximately 0.16 miles of new pipeline from the end point of the Madison Loop to the Sayreville shoreline.
- Raritan Bay Loop (offshore) – approximately 5.96 miles of new pipeline extending from the Sayreville shoreline to the Rockaway Transfer Point in the Lower New York Bay, New York.

The Project is shown on the U.S. Geologic Survey (USGS) topographic maps of Monmouth Junction (Compressor Station 206), South Amboy (Madison and Raritan Bay Loops), Keyport, Sandy Hook West and East, Coney Island (Raritan Bay Loop (offshore)) 7.5-minute (1:24,000) quadrangle, as shown in **Figure 3.** The onshore Madison and Raritan Bay Loops centers on approximately a northing of 588,230 and easting of 551,311 New Jersey State Plane Feet; while the offshore Raritan Bay Loop centers on approximately a northing of 560,386 and easting of 596,089 New Jersey State Plane Feet. State plane coordinates, at 1,000-foot intervals along the entire length of the linear Project area, are depicted on **Figure 3**. **Figure 4** shows the Project relative to local roads. Tax maps for the Project are provided in **Appendix B**.

2.0 PROJECT DESCRIPTION

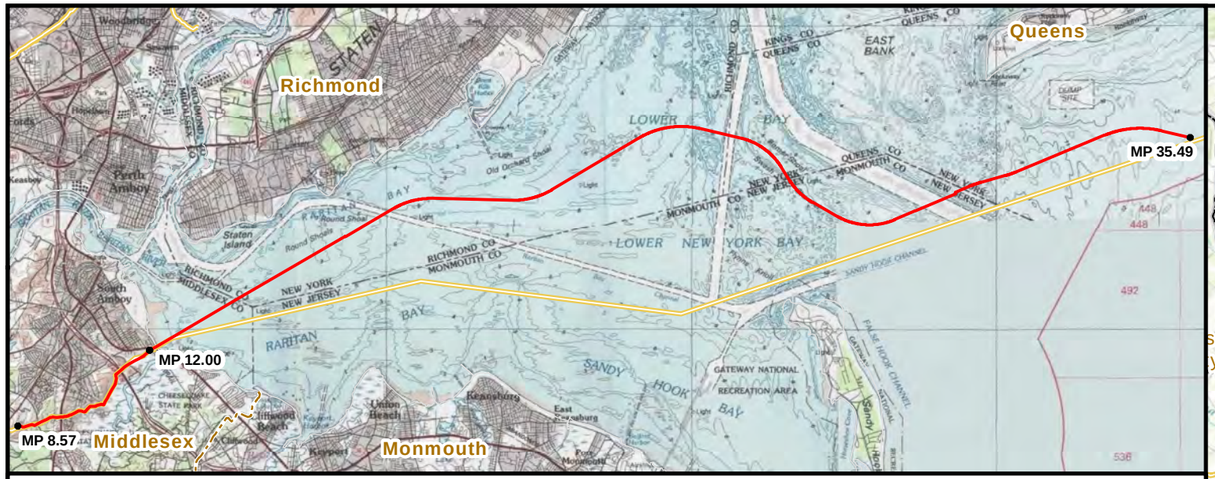
This section describes all proposed Project facilities and components that are the subject of the August 2025 FERC Certificate authorizing Transco to construct and operate the Project. Note that the mileposts (MPs) given for the onshore pipeline facilities correspond to the existing Transco Mainline and Lower New York Bay Lateral (also referred to as Lower Bay Loop C). The offshore pipeline facility MPs are unique to the Raritan Bay Loop. The starting MP for the Raritan Bay Loop corresponds to MP12.00 of the Lower New York Bay Lateral, and the end MP corresponds to the Rockaway Transfer Point.

2.1 ONSHORE PIPELINE FACILITIES

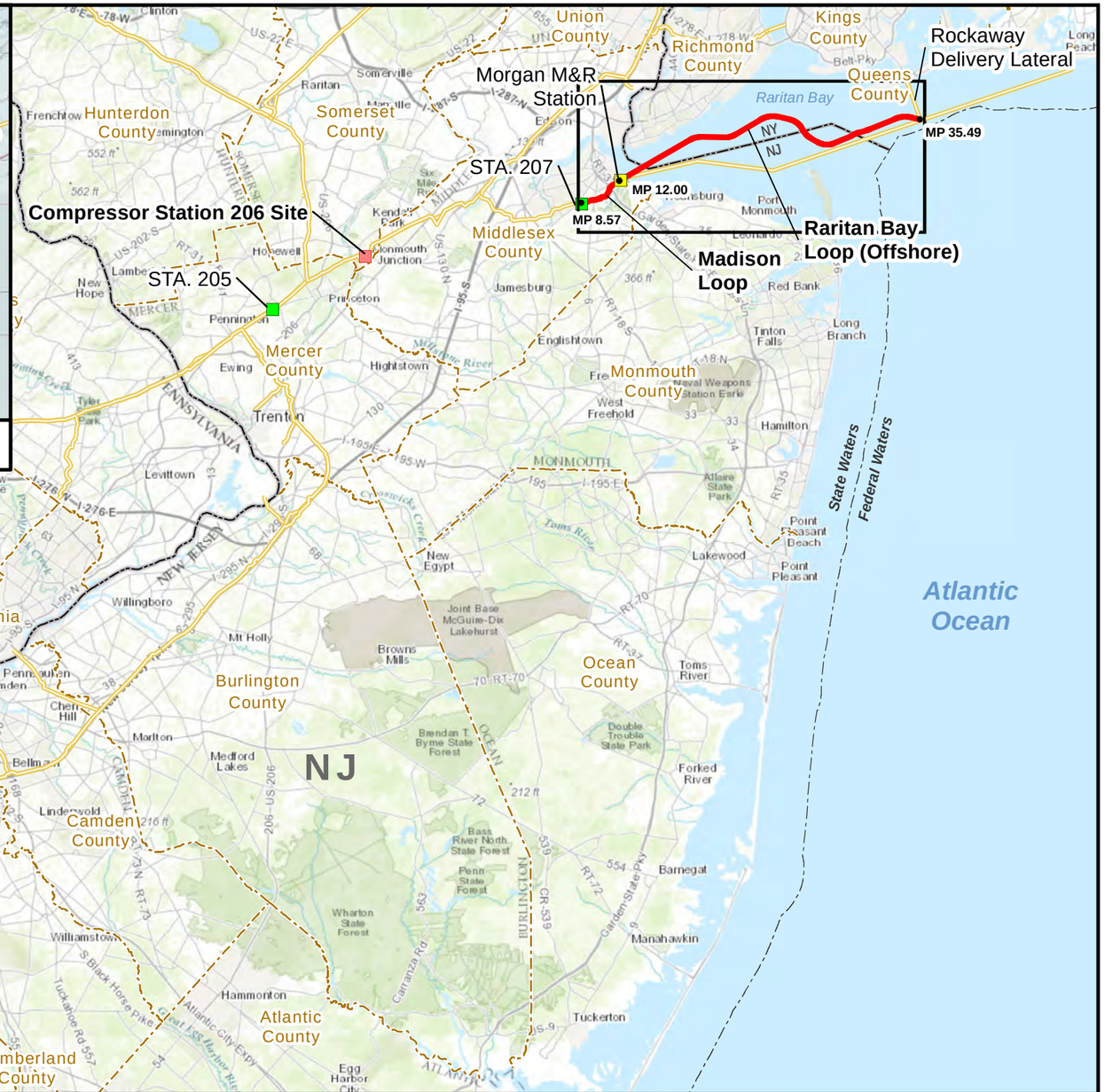
2.1.1 QUARRYVILLE LOOP (PENNSYLVANIA)

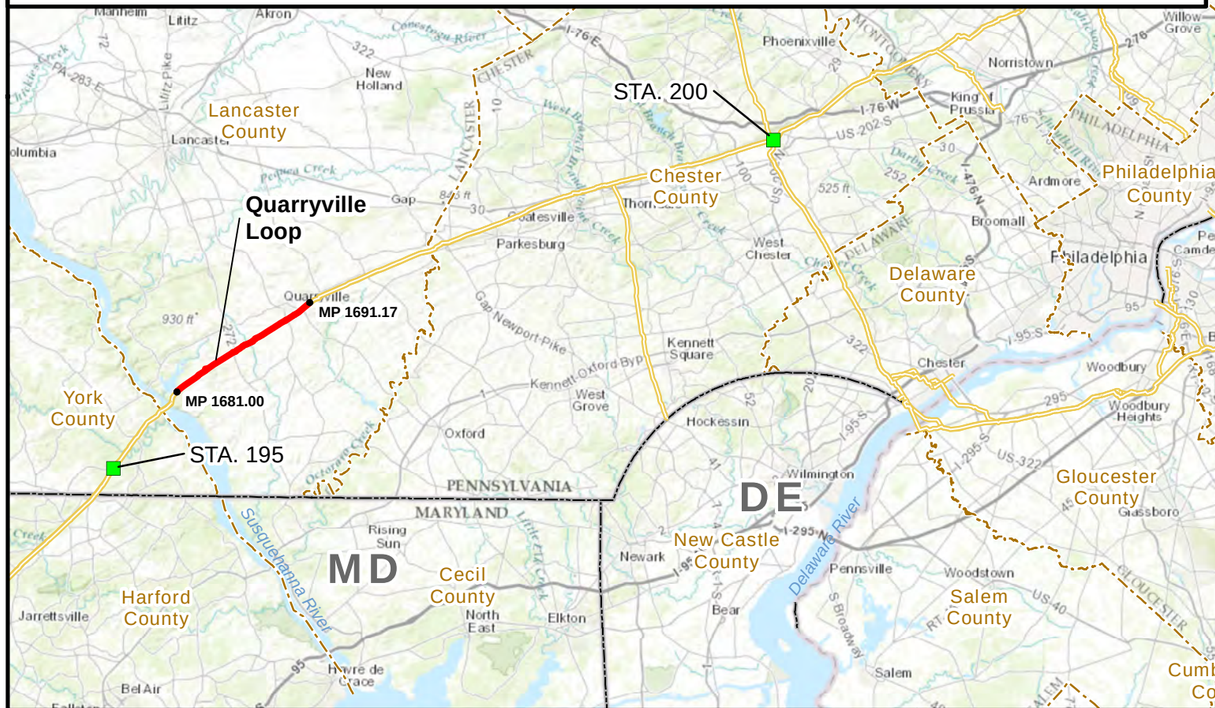
The Quarryville Look consists of 10.17 miles of 42-inch-diameter pipeline from MP1681.00 near Compressor Station 195 to MP1691.17 co-located with the Transco Mainline in Drumore, East Drumore, and Eden Townships, Lancaster County, Pennsylvania. Once in service, the Quarryville Loop will be referred to as Mainline D.

.



Madison Loop and Raritan Bay Loop





Legend

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

N

0 10 20

Miles

SITE LOCATION



DRAWING NO.

REFERENCE TITLE

1

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
PLANNED PIPELINE FACILITIES
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PENNSYLVANIA, NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/13/2017	CE	ISSUED FOR FERC SUPPLEMENTAL FILING	1000891	MK	

DRAWN BY: CE	DATE: 6/13/2017	ISSUE FOR BID: N/A	SCALE: 1:600,000
CHECKED BY: MK	DATE: 6/13/2017	ISSUE FOR CONSTRUCTION: N/A	Project features ver15
APPROVED BY:	DATE:	DRAWING NUMBER:	SHEET 1 OF 1
WO: 1000891		12:31 PM 6/13/2017	FIGURE 1

Data Sources: BOEM 2005; Williams 2017; E&E 2017; ESRI 2012; ESRI Base Map Services 2017.

L:\Buffalo\Williams_NYRE\Map\MXDs\Permit_Request\CoastalZoneConsistency\Fig01_OffshoreFacilities.mxd



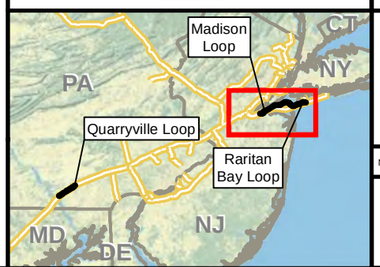
Legend

- Milepost
- Existing Compressor Station
- Existing Meter & Regulating Station
- Proposed Compressor Station Site Alternatives
- Proposed Pipeline
- Existing Transco Pipeline
- County Boundary
- State/Federal Offshore Line
- Coastal Zone Management Act Boundary for the United States and US Territories as of December 2013
- New York City's Waterfront Revitalization Program, Coastal Zone Boundary

N

0 2 4
Miles

SITE LOCATION



DRAWING NO.	REFERENCE TITLE
	2

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	11/17/2016	CE	ISSUED FOR FERC DRAFT FILING	1000891	MK	SM
B	3/22/2017	CE	ISSUED FOR FERC FILING	1000891	MK	SM
C	6/13/2017	RH	ISSUED FOR FERC SUPPLEMENTAL FILING	1000891	MK	

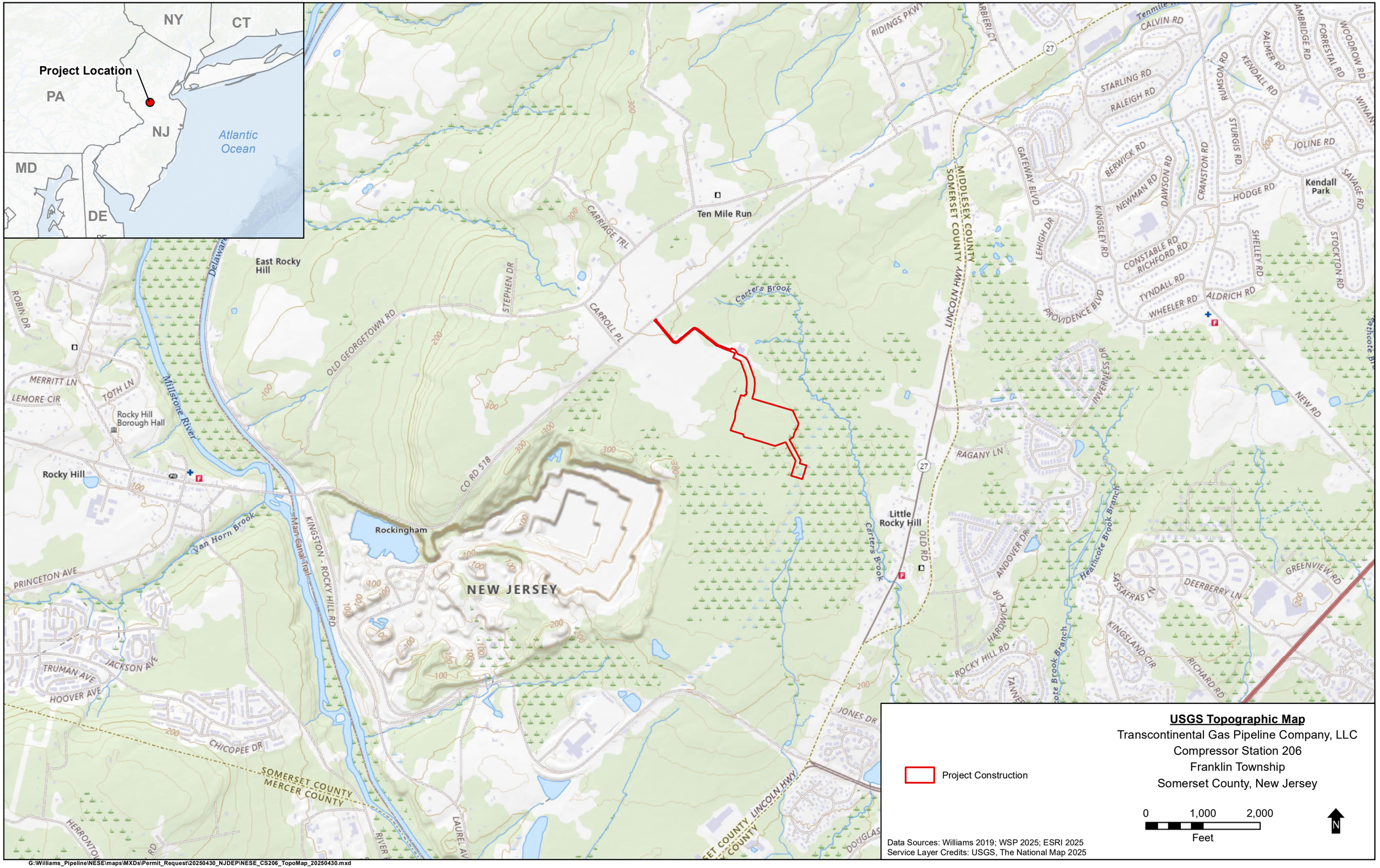
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
COASTAL ZONE
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

DRAWN BY: RH	DATE: 6/13/2017	ISSUE FOR BID: N/A	SCALE: 1:180,000
CHECKED BY: MK	DATE: 6/13/2017	ISSUE FOR CONSTRUCTION: N/A	Project features ver15
APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 2	SHEET 1 OF 2
WO: 1000891		12:34 PM 6/13/2017	

Data Sources: BOEM 2005; Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office for Coastal Management (OCM) 2013; New York City Department of City Planning, Planning Coordination and Waterfront Division 2016; Williams 2017; E&E 2017; ESRI 2012, 2017; NYS Office of Information Technology Services GPO 2016.

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Project Construction

USGS Topographic Map
Transcontinental Gas Pipeline Company, LLC
Compressor Station 206
Franklin Township
Somerset County, New Jersey

0 1,000 2,000
Feet

N

Data Sources: Williams 2019; WSP 2025; ESRI 2025
Service Layer Credits: USGS, The National Map 2025

G:\Williams_Pipeline\NESE\maps\MXDs\Permit_Request\20250430_NJDEP\NESE_CS206_TopoMap_20250430.mxd

Legend

- Project Area
- Coordinate Point



Source:
Bit-Mapped 7.5 Minute Color Topographic Images of New Jersey, United States Geological Survey (USGS), Digital Raster Graphic (DRG) Topographic Series Map, South Amboy NJ/NY NJ Quadrangle, USGS, Reston, Va., January 9, 1996.

New Jersey State Plane Coordinates in NAD83
at approximately 1000-foot intervals along project -

#1	North: 585,020'	//	East: 543,698'
#2	North: 586,047'	//	East: 543,807'
#3	North: 586,216'	//	East: 544,812'
#4	North: 586,525'	//	East: 545,764'
#5	North: 586,964'	//	East: 546,664'
#6	North: 587,056'	//	East: 547,680'
#7	North: 587,206'	//	East: 548,672'
#8	North: 587,597'	//	East: 549,589'
#9	North: 587,642'	//	East: 550,572'
#10	North: 588,230'	//	East: 551,311'
#11	North: 588,418'	//	East: 552,278'
#12	North: 589,039'	//	East: 552,908'
#13	North: 589,911'	//	East: 553,411'
#14	North: 590,811'	//	East: 553,821'
#15	North: 591,753'	//	East: 554,050'
#16	North: 592,418'	//	East: 554,792'
#17	North: 592,943'	//	East: 555,648'
#18	North: 593,414'	//	East: 556,536'
#19	North: 593,962'	//	East: 557,366'
#20	North: 594,566'	//	East: 558,178'

USGS Topographic Map

Transcontinental Gas Pipeline Co. LLC
Northeast Supply Enhancement Project
Madison Loop / Onshore Raritan Loop
Old Bridge Township & Sayreville Borough
Middlesex County, New Jersey

ASGECI Project # 3980

2,000
Feet

AMY S. GREENE ENVIRONMENTAL CONSULTANTS



County Road Map
Transcontinental Gas Pipeline Company, LLC
Compressor Station 206
Franklin Township
Somerset County, New Jersey

Project Construction Workspace

0 1,000 2,000
Feet

N

Data Sources: Williams 2019; WSP 2025; ESRI 2025
Service Layer Credits: ESRI World Street Map Basemap 2025

G:\Williams_Pipeline\NESE\maps\MXDs\Permit_Request\20250430_NJDEP\NESE_CS206_RoadMap_20250430.mxd

Legend

Project Area



Source:
ESRI Street Map North America, Tele Atlas North America, Inc., published by ESRI® Data & Maps, Redlands, California, 2010.

Raritan Bay

Sayreville

South Amboy

Madison Park

Cheesequake State Park

Laurence Harbor

Cliffwood Beach

Parlin

Old Bridge Township

Aberdeen

Main St

Washington Ave

Bordentown Ave

Ernston Rd

Washington Rd

Main St Ext

Bordentown So Amboy Tpke

Old Bridge Tpke

Jernee Mill Rd

Whitehead Ave

Kamm Ave

Macarthur Ave

Cottrell Rd

Springhill Rd

Morristown Rd

Amboy Rd

Cliffwood Ave

Laurence Pky

Cross Rd

Garden State Pky

Matawan Rd

Cheesequake Park Rd

Crossways Creek

Flat Creek

Stump Creek

Melvins Creek

Whale Creek

Long Neck Creek

Tennents Brook

Warnes Brook

Duck Creek

Pond Creek

Deep Run

South River

Catfish Stream

Water St

Main St

Ida St

Major Dr

Hinton St

Snyder Ave

Miller Ave

Rhode St

Glynn Ct

Highland Dr

Pulaski Ave

Deerfield Rd

Maple St

Dolan St

William St

Hart St

Weber Ave

Popowski Ave

Patton Dr

Karcher St

Quaid St

Reid St

Creamer Dr

Calliope Rd

Nickel Ave

George St

Gavel Rd

Colony Club Dr

Quigley Ln

Lincoln St

Leonardine Ave

Colin Dr

Buck Rd

Charter Dr

Lark Dr

Veterans Dr

Flagler St

Donna St

Pearl Rd

Edward St

Devon Dr

Winding Wood Dr

Cross Way

Water Works Rd

Runyon Rd

Perrine Rd

Old Water Works Rd

Poor Farm Rd

Vermeer Dr

Old Rd

Low Rd

Old Mill Rd

Schulmeister Rd

Jake Brown Rd

Stratford Apts

Kearney Ave

CR 516

Sandfield Rd

Bradford Rd

Emerson St

River Rd

Cheesequake Rd

Downing St

Harvard Rd

Columbia Rd

Princeton Rd

Rutgers Rd

Cedar Ter

Pinetree Dr

Haven Ter

Such St

Johnson Ln

Miara St

Albert Dr

Eugene Blvd

Gillen Dr

Duske Dr

Rota Dr

Boehm Dr

Scheid Dr

Annie Dr

Gordon Pl

Doyle Rd

Farrington Rd

Lambertson Rd

Hunter Ct

Stratton Rd

Candlewick Ct

Annmar Dr

Overhill Rd

Roanoke Rd

Briarwood Dr

Disbrow Rd

Union St

Ravine Dr

Harding Rd

Haven Dr

Balmoral Ave

Park Rd

Gordon Rd

Louis Mattei Rd

Dock Rd

Athens Ave

Washington Ave

Pine Ave

Rachele Ct

Taft Pl

Garfield Pl

Carter Pl

Robin Pl

Jackson Ave

N Ernston Rd

Kennedy Dr

Roll Ave

Scott Ave

Raritan St

Railroad Ave

Oak St

Puppek Rd

6th St

4th St

David St

John St

Harkins St

Merritt Ave

Highland St

S Pine Ave

Woodland Ave

Pine Ave

Brook Ave

Stevens Ave

Midland Ave

Cliff Ave

Sunshine Ct

Summerfield Ave

Bayview Dr

Holly Trl

Ely Ave

Cook Ave

Linbrook Dr

Industrial Dr

Greenwood Dr

Rosewood Dr

Raritan Blvd

Ocean Blvd

Hilltop Blvd

Lakeshore Dr

Lenox Rd

Center St

Beverly Dr

N Concourse

Woodmere Dr

Beach Dr

Angel St

Nathan Ct

Cr Rd

Biondi Ave

W Prospect Ave

W Front St

Beers St

Broadway

Ave

St

Rd

Dr

Ct

Ter

Pl

Ln

Trl

Pky

Blvd

Creek

Brook

Run

Ave

Rd

St

2.1.2 MADISON LOOP (NEW JERSEY)

The Madison Loop consists of 3.43 miles of 26-inch-diameter pipeline from Compressor Station 207 at MP8.57 to MP12.00 southwest of the Morgan meter and regulating (M&R) Station on the Lower New York Bay Lateral Loop C in Old Bridge Township and the Borough of Sayreville, Middlesex County, New Jersey. Once in service, the Madison Loop will be referred to as Lower New York Bay Lateral Loop F

2.1.3 RARITAN BAY LOOP (NEW JERSEY)

The onshore portion of the Raritan Bay Loop consists of 0.16 miles of 26-inch-diameter pipeline from MP12.00 west-southwest of the Morgan M&R Station to the Sayreville shoreline at MP12.16. Additionally, a cathodic protection (CP) power cable will be installed from a rectifier located at the existing Transco Morgan M&R Station near MP12.10 and extending to a connecting point on the proposed 26-inch-diameter pipeline at MP12.00. The approximately 545-foot-long power cable will be installed by horizontal directional drill (HDD).

2.2 OFFSHORE PIPELINE FACILITIES

2.2.1 RARITAN BAY LOOP (NEW JERSEY AND NEW YORK)

The offshore portion of the Raritan Bay Loop consists of 23.33 miles of 26-inch-diameter pipeline from MP12.16 at the Sayreville shoreline in Middlesex County, New Jersey, to MP35.49 at the Rockaway Transfer Point in the Lower New York Bay, New York, south of the Rockaway Peninsula in Queens County, New York. Additionally, a 1,831-foot-long CP power cable will be installed via HDD from a rectifier at the existing Transco Morgan M&R Station near MP12.10 to an offshore anode sled located approximately 1,200 feet north of MP12.32. Once in service, the Raritan Bay Loop will be referred to as Lower New York Bay Lateral Loop F.

2.3 ABOVEGROUND FACILITIES

2.3.1 NEW COMPRESSOR STATION 206 (NEW JERSEY)

Construction of a new 32,000 ISO (International Organization for Standardization) horsepower (hp) compressor station and related ancillary equipment in Franklin Township, Somerset County, New Jersey, with two Solar Mars® 100 (or equivalent) natural-gas-fired, turbine-driven compressors.

2.3.2 MODIFICATIONS TO EXISTING COMPRESSOR STATION 200 (PENNSYLVANIA)

Addition of one electric-motor-driven compressor (21,902 hp) and related ancillary equipment to Transco's existing Compressor Station 200 in East Whiteland Township, Chester County, Pennsylvania.

2.3.3 MODIFICATIONS TO EXISTING MAINLINE VALVE FACILITIES (PENNSYLVANIA AND NEW JERSEY)

Modification to existing mainline value facilities include:

- Existing Valve Site 195-5 – Installation of a new mainline valve, launcher/receiver and tie-in facilities at the start of the Quarryville Loop in Pennsylvania (MP1681.00).
- Existing Valve Site 195-10 – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the end of the Quarryville Loop in Pennsylvania (MP1691.17).
- Existing Valve Site 200-55 – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the start of the Madison Loop in New Jersey (MP8.57). Addition of one electric-motor-driven compressor (21,902 hp) and related ancillary equipment to Transco's existing Compressor Station 200 in East Whiteland Township, Chester County, Pennsylvania.

2.3.4 NEW MAINLINE VALVE FACILITIES (PENNSYLVANIA AND NEW JERSEY)

Construction of new mainline value facilities include:

- Proposed Valve Site 195-8 – Installation of a new intermediate mainline valve for the Quarryville Loop in Pennsylvania (MP1687.86).
- Proposed Valve Site 200-59 – Installation of a new mainline (isolation) valve for the Madison Loop in New Jersey (MP11.90).

2.4 ACCESS ROADS

Part of the overall engineering design of the Project is to ensure that suitable construction access is available. Construction of the Project requires that each workspace be accessible by equipment capable of installing the pipeline. Transco will use existing roads and construct new roads to access Project workspaces. Transco will construct temporary access roads as part of the construction phase of the Project and will maintain new permanent access roads for use when operating the Project. In upland areas, temporary access roads will consist of at grade ground and dirt roads. The use of geotextiles and the placement of gravel aggregates are not proposed. Access roads within wetlands and transition areas will consist of prefabricated, interlocking construction mats.

Temporarily disturbed areas will be restored to their pre-existing conditions. All disturbed areas will be provided with permanent vegetative cover in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, and a project specific Soil Erosion and Sediment Control Plan approved by the Freehold Soil Conservation District and Somerset-Union Soil Conservation District, or as directed by the Transco Environmental Management.

2.4 ADDITIONAL TEMPORARY WORKSPACE

Typically, pipeline construction requires ATWS areas at road crossings, wetlands, waterbodies, agricultural land locations, and in areas where specialized construction techniques are required, such as on steep slopes. The configurations and sizes of ATWS areas are site-specific and vary in accordance with the construction method, crossing type, and other construction needs. In addition to ATWS, construction workspace and equipment staging areas will be required for storage of construction materials. It is anticipated that, construction workspaces/equipment staging areas will consist of existing impervious surfaces (i.e. existing parking lots within the vicinity of the Project area).

2.5 PIPELINE RIGHTS-OF-WAY

Transco is required to safely operate and maintain its pipelines pursuant to U.S. Department of Transportation regulations. While federal regulations do not contain express requirements for permanent easement widths, the Interstate Natural Gas Association of America (INGAA) recommends certain minimum permanent easement widths, based on the diameter of the pipeline and topography, to ensure safe pipeline operation, inspection, and maintenance. Under INGAA standards, the typical width of the permanent easement for a 26-inch-diameter underground natural gas pipeline is 50 feet. When the pipeline is looped, the second pipeline is typically offset 25 feet from the first pipeline, and an additional 25-foot-wide permanent easement is required. As it pertains to the Madison Loop, Transco generally followed INGAA recommendations and obtained 25 feet of additional permanent easement; however, in areas where the new pipeline is constructed outside of or not immediately adjacent to the existing easement, Transco obtained additional permanent easement to fill in the gap between the new pipeline and existing easement. Transco generally maintains a 50-foot-wide area over its pipelines. However, where the Madison Loop is installed via HDD, Transco is not proposing to clear or maintain the area over the pipeline.

To minimize the Project footprint, Transco will co-locate the pipeline facilities with existing Transco facilities to the extent possible. One hundred percent of the Madison Loop will be co-located with (adjacent to and partially overlapping) existing Transco right-of-way (ROW). Situating the permanent ROW adjacent to the existing ROW is proposed where needed to accommodate a 25-foot offset between pipe centerlines. A typical 90-foot-wide construction ROW is proposed for installation of the 26-inch-diameter Madison Loop. In wetland areas, the construction ROW will be reduced to 75 feet, where feasible (in accordance with Occupational Safety and Health Administration regulations

[29 Code of Federal Regulations (CFR) 1926.650-1926.652, Subpart P] and the Interstate Natural Gas Association of America's workspace guidelines [INGAA 1999]).

2.6 HORIZONTAL DIRECTIONAL DRILL

The land disturbance associated with the onshore portion of the Raritan Bay Loop will be confined to the workspace required for the upland HDD entry location for the pipeline and HDD entry for the CP power cable and the exit location for the onshore only portion of the CP power cable, the HDD tracking wires (monitoring corridor), and the tie-in with the Madison Loop.

Tracking wires for the installation of the Madison, and onshore portion of the onshore Raritan Bay Loop HDD crossings may be placed on the surface along the proposed alignment in the area of the HDD crossings. During construction, the land surface associated with these activities will be used for HDD tracking wires only; therefore, construction impacts will be limited to foot traffic. Transco will not clear these areas (other than minor hand cutting to provide line of sight) during construction, nor conduct vegetative maintenance in these areas during operation of the Project. Alternatively, an HDD guidance system that uses a full inertial navigation system (INS) located close to the drill head may be used. The INS is a tracking aid that uses a computer, motion sensors (accelerometers), and rotation sensors (gyroscopes) to continuously calculate via dead-reckoning the position, orientation, and velocity (direction and speed of movement) of a moving object without the need for external references. Transco may use one or both of these guidance systems for the onshore HDD crossings.

Temporarily disturbed areas that are not part of the permanent ROWs will be restored to pre-construction contours, stabilized, and revegetated in accordance with approved restoration plans following construction. Permanent ROWs will be maintained in an herbaceous state for the operational life of the pipeline (except for forested wetlands).

3.0 CONSTRUCTION METHODS FOR PIPELINE INSTALLATION

3.1 MADISON LOOP

This section describes the general procedures for the onshore pipeline construction of the Madison Loop. Transco will use conventional techniques to ensure safe and reliable transmission facilities, consistent with all applicable safety standards and regulations.

3.1.1 CONVENTIONAL PIPELINE SECTIONS

Track-mounted excavators will excavate the trench for the pipeline. Generally, the bottom of the trench will be approximately 14 to 24 inches wider than the diameter of the pipe, depending on the nature of the substrate. The depth will vary, as required, to accommodate the minimum cover requirements from the top of the pipeline, in accordance with U.S. Department of Transportation (USDOT) regulations pursuant to the Natural Gas Pipeline Safety Act of 1968.

Except as depicted on site-specific plans or as required by permit conditions, the depth of cover for the pipeline will comply with Transco's standard minimum specifications, which are consistent with or exceed federal regulations. Transco typically will install the pipeline with a minimum of 36 inches of cover, except where consolidated rock prevents this depth of cover.

3.1.2 HORIZONTAL DIRECTIONAL DRILL (ONSHORE)

A portion of pipe will be installed using the HDD method. HDD will be used to install the pipeline crossing in three steps: drilling a pilot hole, opening or reaming the hole, and pulling back the HDD pipe. The HDD method of drilling a hole significantly below conventional pipeline depth and pulling the pipe through the pre-drilled hole allows trenchless construction across an area.

The HDD feasibility summary for the onshore proposed HDD within the New Jersey coastal zone is provided in "26-inch Northeast Supply Enhancement Project, Madison Loop – Lockwood marina HDD Feasibility Review," prepared by GeoEngineers, and dated May 2, 2018 (provided as an enclosure with this application submittal). The Onshore HDD

Contingency Plan (**see Appendix G**) outlines the measures that Transco will take if there is a failure during the pilot hole drilling, hole reaming, swabbing, or pullback process. If one of these elements of the HDD process is unsuccessful, Transco will review an alternative crossing profile or location for the HDD.

To prepare for initiating the pilot hole operation, the entry/exit pits will be excavated and the excavated material deposited next to the entry/exit pits. HDD equipment will then be set up to drill a pilot hole through to the pre-excavated exit pit. The HDD entry and exit pits will collect any drilling fluid released in the containment pit at the end of the pilot hole phase. Through the reaming and pullback stages, drilling fluid will be recycled during HDD operations.

The entry side of the drill workspace usually consists of the drill rig and entry hole, control cab, drill string pipe storage, site office and storage trailers, power generators, bentonite storage, bentonite mixing equipment, pump, cuttings separation equipment, cutting return/settlement pit, water trucks and water storage, and the heavy construction equipment necessary to support the operation.

The exit consists of the exit hole and containment pit, cuttings return/settlement pit, cuttings separation and reclamation equipment, drill string pipe storage, and heavy construction equipment necessary to support the operation. In addition to the drill operations in the exit side workspace, ATWS adjacent to the construction ROW will be needed to provide a straight corridor for handling pipe at HDD locations where the ROW changes direction. This allows the pipe to be prefabricated into one or more sections in preparation for the pull-back operation. Once assembled, the pipe is placed on rollers so it can be conveyed into the drill hole.

To facilitate HDD, an electric guidewire coil (tracking wire) typically is placed along the ground surface between each HDD entry and exit point, where possible, and is used to track the location of the down-hole drilling equipment and to determine steering inputs when advancing the pilot bore. Wireline guidance systems for HDD crossings typically require two guide wires that parallel the centerline of an installation, with a variable spacing or offset on each side of the centerline, depending on the depth of the HDD installation. Transco will place these wires prior to beginning the HDD and remove them once the HDD is complete. The wires will be laid and removed with the assistance of flaggers. The wires are small and can be placed across active roadways without disruption to or from traffic. The HDD tracking wires will be laid using foot traffic only and would not require any excavation and only limited hand trimming of vegetation.

Alternatively, an HDD guidance system that uses a full inertial navigation system located close to the drill head may be used. The inertial navigation system is a tracking aid that uses a computer, motion sensors (accelerometers), and rotation sensors (gyroscopes) to continuously calculate via dead-reckoning the position, orientation, and velocity (direction and speed of movement) of a moving object without the need for external references. Transco may use one or both of these guidance systems for the onshore HDD crossings.

Following completion of the pilot hole, reaming tools are used to enlarge the hole to accommodate the pipe diameter that will be installed. The reaming tools are attached to the drill string at the exit pit and simultaneously rotated and drawn back to enlarge the pilot hole incrementally. During this process, drilling mud consisting of bentonite clay and water is continuously pumped into the hole to remove cuttings and maintain the integrity of the hole. Multiple reaming passes may be required to achieve the desired hole diameter for the pipeline. For both onshore and offshore HDD methods, Transco will use water-based drilling fluids and will not use petroleum-based drilling fluid additives. Drilling fluid additives will be certified for use in drinking water (NSF 60/61)[4], unless otherwise approved by NJDEP. Transco will provide information on all proposed HDD fluid additives to NJDEP for review and approval prior to use.

After the reaming operations are complete, a swab pass will be completed to help condition the enlarged HDD hole and to evaluate whether it is ready for the pipeline (i.e., the "HDD pipe string") to be installed. When the hole has been sufficiently enlarged, a prefabricated segment of pipe is attached behind the reaming tool on the exit side and pulled

4 NSF 60 and NSF 61 are public health standards designed to ensure that drinking water treatment chemicals and water system components do not introduce harmful contaminants into potable water.

back through the drill hole toward the drill rig. The pipe segment will be protected from damage during pullback by the abrasion resistant overlay coating on the pipe.

3.1.3 SPECIALIZED CONSTRUCTION PROCEDURES

In addition to conventional pipeline construction techniques, specialized construction techniques will be used in sensitive resource areas such as waterbody crossings, wetland crossings, residential areas, road crossings, utility crossings, areas with side slopes, and rocky areas. Specialized construction procedures are described below. Transco will use specialized construction techniques to ensure safe and reliable transmission facilities, consistent with Commission and USDOT specifications and applicable safety standards and regulations in place at the time of construction.

3.1.3.1 Waterbody Crossings

Construction methods used at waterbody crossings are highly dependent on the characteristics of the waterbody encountered. Transco will cross several streams via HDD as described above. Additional waterbody crossing methods include: conventional open-cut, dam-and-pump, flume, and a temporary diversion channel, as described below. The pipeline will be buried to a depth of at least four (4) feet below the hard bottom of the stream. **Table 1** summarizes the waterbodies crossed and crossing method for the Madison Loop.

Conventional Open-Cut Crossing Method: The conventional open-cut method employs the same general construction procedures as upland construction described above. The conventional open-cut method will be used for the Project only if there is no perceptible flow in the waterbody at the time of crossing (dry open-cut crossing). The open-cut construction method involves excavating the pipeline trench across the waterbody, installing a prefabricated segment of pipeline, and backfilling the trench with native material. Depending upon the width of the crossing and the reach of the excavating equipment, excavating and backfilling the trench will generally be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. Excavated material from the trench will be placed above the bank high water mark for use as backfill. The pipe segment will be weighted, as necessary, to provide negative buoyancy. No scouring is anticipated based on installation of the existing Transco pipelines. Typical backfill cover requirements will be met, contours will be restored within the waterbody, and the banks will be stabilized via seeding and/or by installing erosion-control matting.

The pipeline trench will be excavated immediately prior to pipe installation to limit the duration of construction within the waterbody to 24 hours for crossings less than 10 feet and 48 hours for crossings between 10 and 100 feet. Excavated materials will be stored no less than 10 feet from the edge of the waterbody and temporary erosion-control devices will be used to prevent the sediment from reentering the waterbody. See Sheets 17 through 20, Construction Details, of the Flood Hazard Area, Madison Loop Plan Set for further details.

Dam-and-Pump Crossing Method: The dam-and-pump crossing method is a modification of the conventional open-cut crossing method that allows the trench to remain dry during pipe installation. Temporary dams, typically consisting of sandbags or plastic sheeting, are installed upstream and downstream of the proposed waterbody crossing. Following dam installation, appropriately sized pumps are used to dewater and transport the stream flow around the construction work area and trench. Intake screens are installed at the pump inlets to prevent entrainment of aquatic life, and energy-dissipating devices are installed at the pump discharge point to minimize erosion and streambed scour.

Trench excavation and pipeline installation through the dewatered portion of the waterbody channel then begin. Following completion of pipeline installation, backfilling of the trench and restoration of stream banks, the temporary dams are removed and flow through the construction work area is restored. This method is generally only appropriate for waterbodies where pumps can adequately transfer the stream flow volume around the work area and where there are no concerns about the passage of sensitive aquatic species. Depiction of typical dam-and-pump construction techniques is provided in the Construction Details of the Flood Hazard Area, Madison Loop Plan Set (see Sheets 17 through 20).

TABLE 1. SUMMARY OF WATERBODIES CROSSED

WATERCOURSE ID	WATERCOURSE NAME	STREAM TYPE	MILEPOST	STATION	PROJECT COMPONENT	CROSSING METHOD	TIMING RESTRICTIONS FOR IN-WATER WORK
WW-T01-001	UNT to Tennent Brook	Intermittent	8.61	101+48	Pipeline	Dry Open Cut	May 1 – July 31
WW-T01-001A	UNT to Tennent Brook	Ephemeral	8.62	-	Workspace	N/A	May 1 – July 31
WW-T01-002	UNT to Tennent Brook	Intermittent	8.76	109+18	Pipeline	Dry Open Cut	May 1 – July 31
WW-T01-002A	UNT to Tennent Brook	Ephemeral	8.76A	-	Temporary Access	Bridge Equip. Crossing	May 1 – July 31
WW-T01-002B	UNT to Tennent Brook	Ephemeral	8.76B	-	HDD Temp. Workspace	Bridge Equip. Crossing	May 1 – July 31
WW-T15-003	UNT to Tennent Brook	Intermittent	9.02	-	Pipeline	HDD	May 1 – July 31
WW-T15-002	UNT to Tennent Brook	Intermittent	9.08	-	Pipeline	HDD	May 1 – July 31
WW-T15-004A	UNT to Tennent Brook	Intermittent	9.21	-	Pipeline	HDD	May 1 – July 31
WW-T15-004B	UNT to Tennent Brook	Intermittent	9.26	-	Workspace	Bridge Equip. Crossing	May 1 – July 31
WW-T15-005	UNT to Tennent Brook	Ephemeral	9.26	-	Workspace	Bridge Equip. Crossing	May 1 – July 31
WW-T01-004	UNT to Cheesequake Creek	Intermittent	10.05	177+41	Pipeline	Dry Open Cut	April 1– June 30
WW-RS-005	Crossway Creek	Perennial	11.55	-	Pipeline	HDD	April 1– June 30
WB-T01-001	Marina (UNT to Cheesequake Creek)	Perennial	11.72	-	Pipeline	HDD	April 1– June 30

Key:
HDD = horizontal directional drilling
ID = identifier
N/A = not applicable
UNT = unnamed tributary

Flume Crossing Method: The flume-crossing method is another dry alternative to the conventional open-cut method in which water flow is temporarily directed through one or more flume pipes placed over the excavation area. The use of the flume(s) allows, primarily under dry conditions, trenching and pipeline installation without significant disruption of water flow while also minimizing downstream turbidity. Depiction of typical flume construction techniques is provided in the Construction Details of the Flood Hazard Area, Madison Loop Plan Set (see Sheets 17 through 20).

Temporary Diversion Channel Method: The temporary diversion channel method is another dry alternative to the conventional open-cut method in which water flow is temporarily diverted to a designated portion of the stream channel to allow construction activities to take place in the stream, along the banks, or beneath the active channel. Using a temporary diversion channel involves installing the pipe using a phased approach as presented below:

- Phase 1: install a diversion dam;
- Phase 2: install pipeline through the dry portion of the stream bed;
- Phase 3: construct and stabilize the diversion channel;
- Phase 4: adjust diversion dams to flow into the temporary diversion channel;
- Phase 5: install pipe through the dry portion of the stream bed;
- Phase 6: complete stream bank restoration;
- Phase 7: stabilize stream channel and remove diversion dikes to restore flow; and
- Phase 8: restore the site to pre-construction conditions.

3.1.3.2 Wetland Crossings

Operation of construction equipment through wetlands will be limited to only that which is necessary for each stage of pipeline installation (e.g., clearing, trenching, etc.). Transco anticipates crossing all wetlands along the Madison Loop via open cut or HDD. Wetland crossing methods for the pipeline portion of the Project were determined based on site-specific conditions and anticipated permit specifications. Transco's preliminary engineering analysis indicates that no wetlands need to be crossed via the push-pull method. Construction procedures across wetlands that are unsaturated at the time of construction will be similar to those used in upland areas. Topsoil will be segregated in unsaturated wetlands in the area of the trench line to preserve the seed bank and allow for successful revegetation. In forested wetlands, Transco will minimize tree clearing to the extent practicable while maintaining safe construction conditions. Construction will proceed in saturated wetlands, but topsoil will not be segregated due to the saturated, unconsolidated conditions.

Pipe stringing and fabrication may occur within saturated and unsaturated wetlands adjacent to the trench or adjacent to the wetland in a designated ATWS. Soil structure and the presence of standing water commonly found in wetlands along with the large surface loads of construction equipment and materials to construct large diameter pipelines contribute to the need for ATWS. Hydric soils typically are lower in strength and become weaker when saturated. Handling weak material during the excavation/stockpile process further reduces the strength of the soil mass by disturbance/remolding/mixing, thus requiring a larger area to stockpile the soils. Additionally, buoyancy control (e.g. weights, concrete-coated pipe) may be necessary in wetland environments, which require the trench to be larger in both width and depth, resulting in additional stockpile material. Consequently, wetland soils crossed by pipelines have properties contributing to the need for increased workspace for both trenching and stockpiling. In some cases, where site-specific conditions may not support construction equipment, or in saturated wetlands where soils are unstable, construction mats will be used to minimize disturbances of wetland hydrology and to maintain soil structure.

Operating construction equipment in wetlands will be limited to only that necessary for each stage of pipeline installation (e.g., clearing, trenching) and suction and discharge piping and tie-in construction at Compressor Station 206. The conventional open-cut wetland crossing method utilized for the pipeline installation is described in further detail below.

Unsaturated Wetlands: Transco will use the conventional open-cut pipeline crossing method in wetlands where soils are non-saturated and able to support construction equipment at the time of crossing. This method requires segregating topsoil from subsoil along the trench line. Where present, Transco will segregate 12 inches of topsoil from the area disturbed by trenching. Once this is complete, Transco will excavate the trench, lay the pipe, backfill, and upon backfilling replace the segregated topsoil and install applicable temporary erosion control measures.

Saturated Wetlands: Transco will use the conventional open-cut wetland construction method for crossing wetlands with saturated soils or soils unable to support construction equipment without considerable soil disturbance. Prior to crossing these wetlands, Transco will stabilize the ROW using equipment mats to allow for stable, safe working conditions and to prevent significant rutting/soil disturbance. Transco will temporarily store trench spoil in a ridge along the pipeline trench, leaving gaps at appropriate intervals to provide for natural circulation or drainage of water. Topsoil will not be segregated where standing water is present, or soils are saturated. Pipe stringing and fabrication may occur within the wetland adjacent to the trench or adjacent to the wetland in an approved ATWS. Transco will excavate the trench, lay the pipe, backfill, and install applicable temporary erosion control measures.

3.2 RARITAN BAY LOOP

Transco is proposing to construct a new 26-inch-diameter pipeline loop beginning at MP12.00 of the proposed Madison Loop, west-southwest of the Morgan M&R Station, on the Lower Bay Loop C in Middlesex County, New Jersey. This new pipeline loop will include a 0.16-mile onshore component, including a portion of a land-to-water HDD, extending from MP12.00 southwest of the Morgan M&R Station to the Sayreville shoreline in Middlesex County, New Jersey (MP12.16).

The offshore Raritan Bay Loop will extend from the Sayreville shoreline (MP12.16), with a land-to-water HDD, approximately 23.33 miles across Raritan Bay and Lower New York Bay to the Rockaway Transfer Point. Approximately 5.95 miles of the offshore Raritan Bay Loop route crosses New Jersey waters, while the remaining 17.38 miles cross New York waters. Transco considered a variety of offshore trenching and installation tools and techniques for installation of the Raritan Bay Loop. Transco has selected a suite of offshore construction methods, including pre-lay clamshell, post-lay jet trencher, and HDD, for the Raritan Bay Loop to complement the site-specific conditions located along the pipeline route, with particular focus on installation efficiency, minimization of sediment disturbance in conjunction with site-specific burial depth requirements, and future success of facility operations (see **Table 2** for a breakdown of construction methods by MP and **Table 3** for subsea pipeline installation methods).

Each construction method included in **Table 2** is described in detail below, along with a discussion of the selection process for the application of the three offshore installation techniques along the various portions of the Raritan Bay Loop. The construction techniques described in detail below have been selected to ensure safe and reliable transmission facilities, consistent with applicable U.S. Army Corps of Engineers (USACE), FERC, U.S. Coast Guard (USCG), and USDOT specifications, safety standards, and regulations in place at the time of construction. The entire offshore portion of the Project constitutes a waterbody crossing.

3.2.1 CLAMSHELL DREDGE WITH ENVIRONMENTAL BUCKET

As described in **Table 2,** below, Transco will use a clamshell dredge with an environmental bucket to perform the pre-lay trenching between MP12.50 and MP14.02. This method will also be used to excavate the three offshore HDD pits in New Jersey (MP12.50, MP29.52, and MP30.40). Pre-lay trenching refers to an installation technique whereby the trench is first excavated, then the pipeline string is laid directly into the excavated trench. Transco has elected to use the clamshell dredge method for the HDD pits, as it is the tool best suited to excavate the pits to the necessary dimensions. The rate of excavation of the clamshell dredge is slower than that of the jet trencher, the alternative subsea trenching tool that Transco will use for trench excavation along the Raritan Bay Loop. Therefore, to minimize the duration of the in-water construction activities and disturbances, Transco does not consider it feasible to use a clamshell dredge to excavate the entirety of the offshore trench.

TABLE 2. OFFSHORE RARITAN BAY LOOP INSTALLATION AND BACKFILL METHODS

MILEPOST START	MILEPOST END	PROPOSED TRENCHING METHOD[D]	PROPOSED BACKFILL METHOD	TOTAL ESTIMATED VOLUME (CUBIC YARDS)
CP HDD Pit Excavation ~1,200 feet north of 12.30		Clamshell Dredge	Clamshell Dredge	461
12.10	12.30	HDD (CP Power Cable)	N/A	N/A
MSA HDD Pit Excavation at 12.50		Clamshell Dredge	Clamshell Dredge	9,931
12.20	12.50	HDD (MSA)	N/A	N/A
12.50	14.02	Clamshell Dredge	Clamshell Dredge	63,868
Neptune Cable Crossing at 13.88		Hand Jet	Hand Jet[a]	1,676
26.55	29.52	Jet trencher	Clamshell Dredge[b]	51,548
AC HDD Pit Excavation at 29.52		Clamshell Dredge	Clamshell Dredge	14,050
29.52	30.40	HDD (AC)	N/A	N/A
AC HDD Pit Excavation at 30.40		Clamshell Dredge	Clamshell Dredge	32,450
30.40	30.64	Jet trencher	Clamshell Dredge[b]	4,187
			Total Volume	178,171[c]

Notes:

[a] If the hand jet or mass flow excavator is unable to adequately backfill the area using the sediments previously excavated from the trench, or if supplemental backfill is required, then a clamshell dredge will be used to backfill.

[b] Sediment loss from areas installed via jet trencher is expected to be minimal (maximum of 5% trench volume loss). However, if supplemental backfill is required following pipeline installation/final pass, a clamshell dredge will be used to backfill.

[c] Total may not sum exactly due to rounding.

[d] Clamshell bucket to be equipped with an environmental bucket for trenching activities.

Key:
AC= Ambrose Channel
CP= Cathodic protection
HDD = Horizontal directional drill
MSA = Morgan Shore Approach
N/A = Not applicable

TABLE 3. SUBSEA PIPELINE INSTALLATION METHODS

CONSIDERATION	CLAMSHELL DREDGER[A, B]	JET TRENCHER	HORIZONTAL DIRECTIONAL DRILL	COMMENT
Application Pre-Lay or Post-Lay[c]	Pre- and Post-Lay	Post-Lay Only	NA	None
Water Depth Limitation(s)	None	Draft limitation for vessel needed to deploy and recover tool and depth required to avoid navigational hazard associated with post-lay methodology.	None	None
Substrate Limitations	None	Soils containing high peat content	Soils containing significant quantities of gravels, cobbles, and/or boulders; very soft or very loose soil conditions; highly fractured or inconsistent bedrock formations; solution cavities (karst formation)	None
Typical Equipment Size (length x width x height)	20–50 cubic foot bucket	24 x 18 x 10 feet	90 x 10 feet	Actual equipment size, not the vessel it is deployed from
Tool Deployment Methodology	Clamshell dredge mounted on barge, 160 x 60 feet	Jet trencher deployed from vessel, 250 x 75 feet	Drill rig mounted on jack-up barge 190 x 140 feet and supported by 11 piles or mounted on temporary fixed platform composed of three smaller platforms, each 25 x 60 feet, supported by 18 piles and 4 reaction piles. Approximately 10 to 12 piles needed for goal posts to support the HDD string at each HDD pit.[d]	None
Material Deposit Location	Disposed of upland	Majority of material remains in trench with 5% or less of trench material dispersed.	Disposed of upland	None
Estimated Installation Speed	Maximum of 417 cubic yards/hour	656 ft/hr	4 ft/hr[e]	Jet trencher: trench speed is an average over multiple passes
Trench Top Width (feet)	59 - 91	9	150 (MSA HDD exit pit) 137/235 (Ambrose Channel HDD pits)	Number presented for HDD is maximum width of HDD pit.

CONSIDERATION	CLAMSHELL DREDGER[A, B]	JET TRENCHER	HORIZONTAL DIRECTIONAL DRILL	COMMENT
Suspended Sediment Plume – Upper Water Column	small to medium[f]	small	small to medium[f]	None
Suspended Sediment Plume – Lower Water Column	small to medium[f]	medium	small to medium[f,g]	
Extent of Sedimentation	small to medium	medium	small to medium	Clamshell: does not include placement of material as sedimentation. Extent may be variable depending on barge dewatering requirements.

Notes:

[a] Clamshell dredger equipment based on information received from New York Bay Dredgers.
[b] Actual trench will be excavated for post-lay operation. Pre-lay information is for comparison only.
[c] Pre-lay installation methods require the trench is first excavated and the pipeline string is subsequently laid directly into the excavated trench. Post-lay installation methods require laying the pipeline on the seafloor prior to lowering the pipeline into the trench.
[d] For pile descriptions, see Table 4.
[e] Drill rate is based upon combined average duration for the Morgan Shore Approach and Ambrose Channel HDDs.
[f] Medium suspended sediment plumes assume the use of a conventional clamshell bucket for backfilling activities. The use of an environmental bucket with and without barge overflow is expected to result in low suspended sediment plumes in the upper and lower water column.
[g] Sedimentation associated with HDD activities is related to the excavation and backfilling of the HDD pits via clamshell.

Key:
ft/hr feet per hour
HDD horizontal directional drill
MSA Morgan Shore Approach

However, suspended sediment plumes generated when clamshell dredging with an environmental bucket are expected to be smaller than those generated during jet trenching, thereby limiting the application of the jet trencher to use in specific tidal and sediment compositions, including those found from MP12.50 to MP14.02 (see N.J.A.C. 7:7-16.3 of the **Compliance Statement** for further discussion of water quality impacts associated with the Project). Additionally, there are safety and navigational concerns in the ultra-shallow waters between MP12.50 and MP14.02 (depths range from 7 to 12 feet above mean lower low water [MLLW]), as further described below. For these reasons, Transco abandoned the jet trencher as a potential trenching technique in this area and has elected to use the clamshell dredge for trenching along this portion of the Raritan Bay Loop.

Transco consulted with the USCG Harbor Safety Navigation and Operations Committee Energy Subcommittee, and the USACE regarding user conflicts and regulatory requirements during the siting and design stages of the offshore route. As described in **Table 3** and in the narrative below, the jet trencher is a post-lay installation method that requires laying the pipeline on the seafloor prior to lowering the pipeline into the fluidized sediments within the trench. In shallow water depths from MP12.50 to MP14.02, laying the pipeline on the seafloor prior to lowering it into the underlying seabed for any length of time would create a potential navigational safety hazard for recreational boaters traversing the area. Given this navigational safety concern, a pre-lay installation technique, such as the clamshell dredge, is the preferred construction alternative between MP12.50 and MP14.02.

Transco has analyzed the geotechnical data for sediment samples collected along the proposed route to assess whether adjustments to the trench side slopes would be possible as a means of reducing the areas of disturbance. Through this analysis, Transco has determined that areas to be trenched using a clamshell dredge with an environmental bucket (including the anode sled installation and Neptune Cable crossings) are expected to have side slopes of 3H:1V (horizontal:vertical). However, to limit the duration of in-water activities, balance schedule constraints, and avoid navigational hazards in the shallow waters, Transco plans to lay the pipe strings for MP12.5 to MP14.02 and the Morgan Shore Approach HDD string adjacent to one another in the excavated trench between MP12.50 and MP14.02 prior to pullback of the HDD string. Therefore, the base of the trench from MP12.50 to MP14.02 must be 7 feet wide to accommodate both pipe strings. Therefore, the area of disturbance proposed for the areas excavated by a clamshell dredge represents the smallest practicable area of disturbance.

Transco intends to dispose of all dredged material in accordance with its approved dredged material management plan. See the N.J.A.C. 7:7-12.9 of the **Compliance Statement** for further discussion of dredge material disposal.

Transco conducted the sampling campaign for the characterization of dredge material for an upland disposal facility in October and November 2018. Upon completion, results of this effort were provided to local upland disposal facilities for review. In October 2025 Donjon Marine Co. Inc., Bayshore Recycling Corp, Bethlehem Landfill, Pioneer Crossing Landfill, and White Pines Landfill Corporation provided a letter of acceptance for the expected dredged materials from the construction of the Raritan Bay Loop as part of the NESE Project (see **Appendix K**). Transco intends to contact these disposal facilities to confirm their availability for receiving any dredged material. These facility approvals were conditional upon final evaluation of the material after it has been dredged. See **Appendix H** for the Sediment Sampling and Analysis Plan (SSAP) specific to this sampling campaign, **Appendix J** for results of the sampling and analysis effort, and **Appendix K** for copies of correspondence with these facilities.

Sediments from sections of the offshore route that would potentially be excavated by clamshell dredge were evaluated to determine suitability for in-water placement according to federal and state guidelines based on grain size characteristics and bulk sediment chemistry results from Transco's late 2016 sediment survey. Transco compared these results to corresponding characteristics of material from nearby federal maintenance dredging projects that were tested for suitability at the HARS since 2000. Transco considers material from specific "dredge prisms" suitable for in-water placement and submitted a request to the USACE for approval to dispose of this material at the HARS. On December 10, 2025, the USACE issued a combined permit (Permit No. NAN-2016-00908) included Section 103 authorization for the disposition of approximately 800,000 cubic yards (CY) of dredged material for offshore placement in a federally

designated ocean placement site. The material will be transported by ocean-going barges for placement at the HARS in the Atlantic Ocean for the purpose of remediation.

The HARS request will also identify proposed clamshell-dredging areas with material that is not expected to meet criteria for in-water placement. Transco plans to dispose of this material at a suitable facility in accordance with any applicable permit requirements. Transco will consult with the NJDEP, NYSDEC and the USACE to determine if beneficial use options exist for clamshell-dredge sediment not meeting in-water placement criteria.

3.2.2 JET TRENCHER

Transco will use a jet trencher to lower the pipeline to the depths needed for the Project in New Jersey between MP26.55 and MP29.52, and MP30.40 and MP30.64. Transco has elected to use the jet trencher along these portions of the Raritan Bay Loop as this installation tool reduces the total area and volume of sediment disturbance and installs the pipe more quickly than a clamshell dredge, thereby reducing the duration of in-water activities, as well as air emissions in comparison with clamshell dredging.

The jet trencher is a bottom-crawling remotely operated vehicle with highly precise controls, multiple video cameras, and operating sensors to allow operations in challenging weather conditions. In this method, once the pipeline has been placed on the seafloor, the hydraulically powered remotely operated vehicle is deployed overboard from the anchored Project vessel and straddles the pipeline. An armored umbilical provides power, hydraulics, and communications from the Project vessel to the subsea jet trencher. The umbilical allows the jet trencher to traverse laterally from the Project vessel (depending on weather conditions and currents). The jet trencher is equipped with two retractable cutting swords that extend beneath the seafloor, one on each side of the pipeline. High-pressure seawater is pumped through a series of small-diameter nozzles located on the front/forward side of each cutting sword to loosen the soils. Large-diameter nozzles located on the rear/trailing side of each cutting sword expel low pressure, high-volume seawater that fluidizes the sediments, emulsifying the seabed to facilitate lowering of the pipeline. This process allows the pipeline to be lowered under its own weight while eliminating the need to directly remove and/or displace the soils. Because a trench is not excavated, a minimal amount of material is expected to be lost (maximum 5%). If backfill is required (based on post-construction bathymetric surveys), a separate Project vessel will provide the backfill material needed to meet the Project's requirements. Based on the existing sediment characteristics along the Raritan Bay Loop, it is expected that two passes by the jet trencher may be needed to achieve the depths required for the Project.

3.2.3 HAND JETS/MASS FLOW EXCAVATOR

To avoid the risk of damaging existing infrastructure that is associated with other dredging methods, divers using hand jets will expose existing subsea infrastructure at active cable crossings (i.e., the Neptune Cable crossing at MP13.88). Transco will also use hand jetting to install the pipe at other cable crossings if it is determined that any of the additional cables cannot be cut. Transco may also use hand-jetting and/or a crane-operated mass flow excavator (i.e., a small-scale submersible suction pump) to excavate the location where the tie-in skid and spools will be placed to connect the Raritan Bay Loop to the subsea manifold. Material that accumulates adjacent to these excavated areas may be recovered for backfill.

3.2.4 HORIZONTAL DIRECTIONAL DRILLING (OFFSHORE)

In addition to the pipeline installation techniques discussed above, Transco will use HDD in New Jersey offshore areas with construction constraints, including the Ambrose Channel HDD and the Morgan Shore Approach HDD. Horizontal directional drill by design is a technically and environmentally feasible avoidance method, but only when employed under appropriate site-specific conditions that allow construction and do not cause HDD activities to result in increased impacts. Land-to-water and water-to-water HDDs require a fixed work area, excavation for entry and exit pits at fixed locations, fixed installation equipment, sediment and soil disturbance, and, most importantly, suitable geologic conditions indicating that the local substrate will support the installation technology successfully. Considerations during the design of the Morgan Shore Approach HDD and the Ambrose Channel crossing included,

but were not limited to, site and surface conditions, workspace and access (logistics) considerations, HDD geometry, subsurface conditions (i.e., evaluation of geology/geotechnical conditions), installation stress analysis, operating stress analysis, hydraulic fracture and inadvertent returns analysis, and design of entry/exit pits.

The Morgan Shore Approach and Ambrose Channel crossing drill profiles have been designed according to industry best management practices (BMPs), including evaluating subsurface conditions, substrate characterization, and approximate HDD geometry to maximize chances for drill success and minimize the installation and operating stress on the pipe. As designed, the Ambrose Channel crossing HDD extends approximately 840 feet beyond the Ambrose Channel to the west and approximately 650 feet beyond the Ambrose Channel to the east, for a total of approximately 4,643 horizontal feet (0.88 mile). This HDD profile geometry has been determined to be the most suitable for this crossing location while following the BMPs of the HDD industry, minimizing the risks associated with the installation and the stresses imposed on the pipe. The approach of expanding the areas for HDD installation was determined to be infeasible early in the evaluation of installation methods, not only from a construction feasibility standpoint, but also (and more importantly) due to the marked increase in duration of in-water construction and additional ecosystem impacts this would cause, including those associated with pile installation and removal to support HDD operations.

The Morgan Shore Approach and Ambrose Channel HDDs will be installed using the HDD method described for the Madison Loop, above, with additional offshore methods, as described below.

As noted above, Transco will use water-based drilling fluids and will not use petroleum-based drilling fluid additives. Drilling fluid additives will be certified for use in drinking water (NSF 60/61), unless otherwise approved by NJDEP. Transco will provide information on all other proposed HDD fluid additives to NJDEP for review and approval prior to use.

In preparation for initiating the pilot hole operation, a clamshell barge will excavate a pit at the offshore exit point location. This subsea pit serves as a container for both drilling fluid and borehole cuttings, and it affords a smooth, angled transition (4 to 6 degrees) between the drill exit and the seafloor. Transco has calculated an estimated volume of drilling fluid and cuttings that would be contained within the offshore HDD pits based on a conceptual drill plan and corresponding penetration rates and pump rates expected during construction and has determined the excavation dimensions required for the equivalent volume, plus a contingency to ensure that all materials are contained within the HDD pits. The Morgan Shore Approach HDD pit will be able to accommodate approximately 9,931 cubic yards of material, which includes a 30% contingency volume. Turbidity controls at the HDD pits will include the use of casing installed at all offshore HDD pits to promote the return of drilling fluids and the use of an environmental bucket, which, as described in the sediment modeling discussion below, will effectively limit suspended sediment plumes resulting from clamshell dredging activities (see N.J.A.C. 7:7-16.3 of the **Compliance Statement** for further discussion of water quality impacts associated with the Project).

While the pilot hole operation is under way, a marine support barge will be used to install goal posts between the exit point and the anticipated offshore location where a temporary fixed platform will be staged during the HDD activities. The marine support barge will most likely use spuds that are placed into the seafloor for increased stability when working with heavy equipment in marine environments. The marine support barge and other support vessels (i.e., tugs and equipment barges) will assist with goal post installation and drill activities.

The goal posts, which will likely consist of hollow steel piles 14 to 16 inches in diameter, will likely be installed using a vibratory device unless gravity/pressure is sufficient to sink the piles to a suitable depth in the given substrate. Goal posts are required to support the downhole drill pipe string and casings to be used and to extend between the HDD equipment on the temporary fixed platform and the seafloor during the HDD installation process. During goal post installation, dolphin or fender piles will also be installed adjacent to the final position of the temporary fixed platform (positioned during reaming operations) to prevent the support vessel from contacting the temporary fixed platform support piles. Transco's pile-driving installation plan is described further below and provided in **Table 4**, below. Once

the borehole is complete, the inclined drill pipe string will be saddled through the goal post supports to transition the drill pipe string from the offshore exit point to the deck of the temporary fixed platform for reaming activities.

The pipelay barge will move into position to support connecting the offshore end of the drill pipe string to the HDD pipe pullhead. Once this connection is made, the pipelay barge will assist in aligning the pipe's angle to the drilled hole for easy entry of the HDD pipe string to the prepared HDD hole (the marine support barge may assist in this activity). The HDD rig stationed onshore will pull the HDD pipeline section through the hole to the onshore HDD entry point. During HDD pipe installation, the temporary fixed platform and other support vessels will assist in aligning the pipeline string as it is pulled into the HDD hole. The pipe segment will be protected while on the seabed through proper anchor placement and lighted buoys that mark the pipe position. During pullback, the pipeline string will be protected through the utilization of an abrasion-resistant coating.HDD for the Ambrose Channel crossing will be similar to the Morgan Shore Approach HDD, except Transco will use the intersect method to cross the Ambrose Channel, and drilling equipment will be staged on and operated from a liftboat at both the east and west HDD pits. The intersect method utilizes two drill rigs—a primary and a secondary rig—drilling from opposite ends of the HDD path toward the middle. The primary and secondary rigs operate simultaneously, drilling the pilot borehole toward a predetermined intersect location using a downhole pilot hole survey system. Similar to the methods described above for the Morgan Shore Approach, the dredge will excavate pits at the entry point and the exit point and then a vibratory device will be used to install piles ("goal posts") on opposite sides of the Ambrose Channel. Following goal post installation, liftboats, dolphin/fender piles, and a casing will be set up at both HDD pits extending up to the deck of the drill barge. The casing will be removed before pipe string pullback.

The onshore HDD boreholes may be grouted following completion of pipeline and cathodic protection cable installation. However, Transco does not propose grouting the offshore boreholes as it is not considered necessary or feasible for the following reasons:

- The Ambrose Channel entry/exit points are over 2 miles from the nearest land masses (i.e., the Sandy Hook Peninsula and Rockaway Peninsula), and any associated freshwater aquifers.
- The Morgan Shore Approach offshore exit point for the pipe is approximately 1,500 feet from the shoreline; additionally, much of the HDD fluid at the Morgan Shore Approach will be captured in the onshore entry pit and the onshore borehole will be grouted.
- The exit point for the cathodic protection cable is approximately 1,000 feet from shore and the borehole is substantially smaller than for the pipeline.
- A casing will extend from the barge deck or offshore platform to the HDD pit to prevent release of HDD fluid into the water column.
- The HDD fluid is denser than seawater, it would tend to flocculate upon contact with saline water (assuming use of bentonite), and it would further thicken as it is mixed with cuttings from the borehole, such that any returns are expected to remain within the HDD exit pit.
- The saturated sediment is expected to naturally close around the installed offshore pipeline immediately following completion of the HDD, effectively sealing the borehole void.
- Based on a review of the geotechnical characteristics, the unconsolidated offshore sediments are not expected to contain the high pressures required to inject grout into the targeted area, which would likely lead to scouring and release of the grout slurry into the water column.
- The HDD entry/exit pits will be backfilled (capped) with clean sand that will prevent release of residual HDD fluid and cuttings into the water column.

3.2.5 PILE INSTALLATION AND REMOVAL

The Project will include the installation and removal of 163 piles (135 in New Jersey waters), some of which have been introduced above. The pile type, diameter, quantity, and installation purpose are shown in **Table 4**, below. See the Waterfront Development Permit Plans for the Raritan Bay Loop sheets 3, 5, and 8 for a depiction of the pile configuration. The goal posts and fender piles will remain in the offshore environment only for the duration of the HDD portion of offshore construction (approximately 5 to 10 weeks, throughout the HDD activities). The temporary fixed platform piles will remain in the offshore environment only for the duration of the Morgan Shore Approach HDD. All other piles would remain in the offshore environment only for the duration of each related construction activity.

Diesel impact hammers and vibratory devices are commonly used for in-water pile installation and removal. Impact pile drivers are piston-type drivers that use various means to lift a piston to a desired height and drop the piston against the head of the pile to drive it into the substrate (ICF Jones & Stokes, and Illingworth and Rodkin, Inc. 2009). Diesel impact hammers will be used to install approximately 30 steel piles, as outlined in **Table 4**. The vibratory device is considered a continuous low-frequency noise source because it continuously vibrates the pile into the substrate until the desired depth is reached. A vibratory device uses spinning counterweights, causing the pile to vibrate at a high speed. The vibrating pile causes the soil underneath it to "liquefy" and allow the pile to move easily into or out of the sediment. Vibratory devices will be used to install and remove 135 steel pipe piles, as outlined in **Table 4**.

TABLE 4. PILE DRIVING SUMMARY FOR THE RARITAN BAY LOOP[A,B]

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

Milepost	Site	Pile Type	Purpose	Diameter (in.)	Quantity	Permanent / Temporary	Installation Method	Installation		Removal	
								Driving Time Per Pile[c]	Duration (days)[D]	Removal Time	Duration (days)[D]
			fender piles being installed.								
29.4	Ambrose Channel HDD West Side	Reaction Frame Piles	Provide additional lateral capacity for HDD pipeline pull.	36-60	8	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I- 38 Min / Pile [ef]	4	30 min/pile	0.5
29.4	Ambrose Channel HDD West Side	Support Barge Fender Piles	To tie up and breast support barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile	1.5	15 min/pile	1
29.4	Ambrose Channel HDD West Side	Water Barge Fender Piles	To tie up and breast water barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile		15 min/pile	
29.4	Ambrose Channel HDD West Side	HDD String Goal Posts	Support HDD string.	24	12	T	Vibratory Hammer	V-15 Min/Pile	1.5	5 min/pile	2
30.48	Ambrose Channel HDD East Side	Ambrose East Vertical Stabilization Piles	Ensures HDD string is secured while awaiting pullback.	24	22	T	Vibratory Hammer	V -15 Min/Pile	5	15 min/pile	0.5
30.48	Ambrose Channel HDD East Side	W751 Side Piles	Landing of small barges/vessels alongside prior to fender piles being installed.	36	3	T	Vibratory Hammer	V-15 Min/Pile	0.5	15 min/pile	0.5
30.48	Ambrose Channel HDD East Side	Support Barge Fender Piles	To tie up and breast support barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile	1	15 min/pile	1
30.48	Ambrose Channel HDD East Side	Water Barge Fender Piles	To tie up and breast water barge alongside HDD operations.	36-48	4	T	Vibratory Hammer	V-15 Min/Pile		15 min/pile	
30.48	Ambrose Channel HDD East Side	HDD Drill String Goal Posts	Support HDD string.	24	10	T	Vibratory Hammer	V-15 Min/Pile	1.5	5 min/pile	2
30.48	Ambrose Channel HDD East Side	Pipelay Barge Mooring Pile	Assist the pipelay barge with mooring when recovering the HDD tail string at Ambrose East.	60	1	T	Vibratory Hammer	V-15 Min/Pile[f]	0.5	15 min/pile	1

Milepost	Site	Pile Type	Purpose	Diameter (in.)	Quantity	Permanent / Temporary	Installation Method	Installation		Removal	
								Driving Time Per Pile[c]	Duration (days)[d]	Removal Time	Duration (days)[d]
34.5 to 35.04	MP34.5 to MP35.04	Pipelay Barge Mooring Pile	Assist the pipelay barge with mooring in the vicinity of the Rockaway Manifold.	34	4	T	Vibratory & Diesel Impact Hammer	V -15 Min/Pile I- 52 Min/ Pile [e]	3	15 min/pile	2
35.04	Neptune Power Cable Crossing (MP35.04)	Crossing Pile	To ensure temporary stability of the pipeline at the crossing location.	10	2	T	Vibratory Hammer	V-15 Min/Pile	1	15 min/pile	1

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

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

4.0 CONSTRUCTION SCHEDULE

Transco proposes construction and restoration activities for the Project from 1st quarter 2027 through 1st quarter 2028 (**Table 5**). The Project has an anticipated 4th quarter 2027 in-service date. Transco's planned work schedule typically is 6 days per week (Monday through Saturday) from 7:00 a.m. to 7:00 p.m. for all onshore construction activities, excluding HDD drill operations, which will continue for 24 hours per day until completion of the HDDs. For offshore construction activities, Transco's planned work schedule will typically be 24 hours per day, 7 days per week. The proposed construction schedule for the New Jersey portions of the Madison Loop and Compressor Station 206 phases of the Project is summarized in the following table. A summary of HDD activities for the Madison Loop and onshore portions of the Raritan Bay Loop is also presented below (**Table 6**).

TABLE 5. CONSTRUCTION RESTORATION SCHEDULE

Task	Start Date	Completion Date[a]
Madison Loop		
HDD Pipeline (Parkwood Village HDD)[b]	Q1 2027	Q2 2027
HDD Pipeline (Cheesequake Road HDD)[b]	Q1 2027	Q2 2027
HDD Pipeline (Lockwood Marina HDD)[b]	Q1 2027	Q2 2027
Conventional Construction Section	Q1 2027	Q4 2027
Loop Restoration	Q2 2027	Q4 2027
Compressor Station 206		
Construction	Q1 2027	Q4 2027
Restoration	Q4 2027	Q1 2028

NOTES:

[a] Dates are as of May 2025.

[b] Each onshore HDD will take approximately 3 to 4 weeks to complete and are expected to occur in Q1 and Q2 2027.

KEY:

HDD = Horizontal directional drill

Q = Yearly quarter

TABLE 6. SUMMARY OF HDD ACTIVITIES

HDD	Purpose of HDD	Approximate Diameter of Bore Hole (inches)	Length (feet)	Entry Pit MP	Exit Pit MP	Approximate Duration of Drilling (days/weeks)	Approximate Timeframe for Drilling (quarter/year)
Madison Loop							
Cheesequake Road HDD	Avoids impacts to stream/wetland complex along the ROW	38 – 44 inches	1,900	9.28	8.92	Approximately 21 days/4 weeks	Q1 2027 – Q2 2027
Parkwood Village HDD	Avoids impacts to residential area	38 – 44 inches	2,300	9.86	9.43	Approximately 25 days/4 weeks	Q1 2027 – Q2 2027
Lockwood Marina HDD	Minimized impacts to Cheesequake Creek and Marina	38 – 44 inches	1,785	11.49	11.84	Approximately 20 days/3 weeks	Q1 2027 – Q2 2027
Raritan Bay Loop (Onshore Only)							
Short CP Power Cable HDD	Avoids impacts on the New Jersey Route 35	6 inches	545	12.10	12.00	Approximately 1 week	Q3 2027 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	12.00	12.50	Approximately 47 days/approximately 7 weeks	Q2 2027 – Q3 2027
Long CP Power Cable HDD (onshore to water)	Avoids impacts on the New Jersey Transit commuter railroad, roads, and impacts on cultural resources and the shoreline	6 inches	1,831	12.10	A point 1,200 feet north of MP12.32	Approximately 1 to 2 weeks	Q3 2027 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 the New York Harbor.	38 – 44 inches	4,643	30.40	29.52	Approximately 34 days/ approximately 5 weeks	Q2 2027 – Q3 2027

5.0 SEQUENCE OF CONSTRUCTION ACTIVITIES FOR PIPELINE INSTALLATION

5.1 MADISON LOOP

5.1.1 CONVENTIONAL PIPELINE TRENCHING

Following pre-construction surveying and staking activities, Transco will clear and grade the construction corridor to remove vegetation, brush, trees, roots, and other obstructions such as large rocks and stumps. Crews will also grade the ROW, where necessary, to create a level workspace safe for construction work. Transco will install temporary fences and gates, as needed. As appropriate, the clearing and grading operations will incorporate special construction procedures to minimize the amount of vegetation removed from stream banks and slopes, prevent undue disturbance of the soil profile, restore the original contours of the natural ground, and prevent topsoil erosion. Following establishment and clearing of workspace boundaries, Transco will install temporary soil erosion- and sediment-control measures in accordance with the approved Soil Erosion and Sediment Control Plans.

Track-mounted excavators will excavate the trench for the pipeline. Generally, the bottom of the trench will be approximately 14 to 24 inches wider than the diameter of the pipe, depending on the nature of the substrate. The depth will vary, as required, to provide at least sufficient depth for the minimum cover requirements from the top of the pipeline, in accordance with USDOT regulations pursuant to the Natural Gas Pipeline Safety Act of 1968. Except as depicted on site-specific plans or as required by permit conditions, the depth of cover for the pipeline will comply with Transco's standard minimum specifications, which are consistent with or exceed federal regulations. Transco typically will install the pipeline with a minimum of 36 inches of cover, except where consolidated rock prevents this depth of cover.

Transco will procure factory-coated steel pipe in nominal 40-foot and 60-foot lengths. (The beveled ends will be left uncoated for welding.) Stringing operations involve moving pipe sections into position along the prepared ROW. Typically, Transco will use trucks to deliver the pipe to approved construction workspaces. Transco will string individual joints of pipe along the ROW parallel to the centerline and arrange them so they are easily accessible by construction personnel. The amount of pipe necessary for waterbody or road crossings typically will be stockpiled in contractor yards or other approved workspace areas near each crossing.

Once the pipe has been welded together, coated, and inspected, it will be lowered into the trench. If the bottom of the trench is rocky, Transco will protect the pipe by using sandbags or support pillows at designated intervals along the trench. Trench dewatering may be necessary in certain locations to prevent the pipe from floating and to allow certain limited activities to be performed in the trench. Transco will dewater trenches in accordance with applicable permits and BMPs, included in Transco's Project-specific Upland Erosion Control, Revegetation, and Maintenance Plan (Transco Plan) and Project-specific Wetland and Waterbody Construction and Mitigation Procedures (Transco Procedures).

At selected locations (e.g., waterbody crossings, road crossings, terrain changes along the pipeline), the pipe will be lowered into the trench in segments. Welders will then weld the segments together or tie them in prior to backfilling. A crew will be assigned to make these tie-ins at designated locations ahead of the backfill operations.

After the pipe is lowered into the trench, the trench will be backfilled. Backfill usually consists of the material originally excavated from the trench; however, in some cases, additional backfill from other sources may be required. Transco will use a conventional backfill and/or a padding machine, or an equivalent backfilling process, depending on the composition of the soil, that will prevent rock material mixed with subsoil from making direct contact with the pipe. Transco anticipates that padding operations will provide 6 inches of screened subsoil cover below and along the sides of the pipe. Once the pipe is adequately protected with screened subsoil, conventional backfilling operations will occur. In areas where topsoil has been segregated, the subsoil will be placed in the trench first, and then the topsoil will be placed over the subsoil. Backfilling will be to approximate grade; however, Transco may place a soil crown above the trench to accommodate any future soil settlement.

After backfilling, Transco will grade disturbed areas and will properly dispose of any remaining trash and debris. Transco will protect the construction workspaces by implementing permanent erosion-control measures, including site-specific contouring, slope breakers, mulching, and reseeding to establish soil-holding vegetation. Transco will use acceptable excess soils from construction for contouring.

Transco's cleanup and restoration activities will be in accordance with the Transco Plan, the Transco Procedures, and in accordance with an NJDEP-approved restoration plan. In accordance with the Transco Plan, cleanup operations will begin immediately following backfill operations. Transco will complete final grading, topsoil replacement, and installation of permanent erosion-control structures within 20 days of backfilling the trench and within 10 days in residential areas. If seasonal or other weather conditions prevent compliance with these timeframes, Transco will maintain temporary erosion-control devices until the cleanup is completed.

5.1.2 CONVENTIONAL BORE CROSSING

Transco is proposing conventional bore crossings along Madison Loop to cross selected roads, including the Garden State Parkway North (MP 11.21), Gondek Drive (MP 11.43), and Old Spye Road (MP 11.97). Typically, additional typical workspace (ATWS) is required to provide the necessary space for the boring machine to insert a pipe joint or pipe string (two or more joints welded together) into the borehole. The depth of the bore pit will depend upon topography to ensure that a minimum cover is over the bored pipeline segment.

5.1.3 HORIZONTAL DIRECTIONAL DRILL

In addition to the construction techniques discussed above for the pipeline, Transco will use HDD in sensitive onshore resource areas such as wetlands and waterbody crossings and in areas with construction constraints, such as residential areas, roadways, or railroad crossings. Roadways that will be crossed via HDD include Cheesequake Road (MP 8.99), US Highway 9 (MP 9.49), and Westminster Boulevard (MP 9.75). A summary of HDD Activities for the Madison Loop is provided in **Table 6,** above.

HDD feasibility reports for each of the proposed onshore HDDs are provided within this permit application package (**Appendix F**). If an HDD is unsuccessful, Transco will implement its Onshore HDD Contingency Plan (**Appendix G**). The Onshore HDD Contingency Plan outlines the measures that Transco will take if there is a failure during the pilot hole drilling, hole reaming, swabbing, or pullback process. If one of these elements of the HDD process is unsuccessful, Transco will review an alternative crossing profile or location for the HDD.

5.2 RARITAN BAY LOOP

5.2.1 PRE-TRENCHING, CABLE CROSSINGS, AND INITIAL PIPELAY

The section of buried offshore pipeline in New Jersey will extend from the exit pit for the Morgan Shore Approach HDD crossing at MP12.50 to MP14.02, where it crosses into New York waters; from MP26.55 to the exit pit of the Ambrose Channel HDD crossing at MP29.52; and from the entry pit for the HDD Ambrose Channel crossing at MP30.40 to MP30.64, where it again crosses back into New York waters. This section of externally concrete-weight coated pipeline will be buried to a minimum depth of 4 feet and in accordance with any permit conditions as directed by the USACE. If Transco cannot achieve the required burial depth, (e.g., at the Neptune Cable crossing near offshore MP13.88), then the pipeline will be covered with concrete (or equivalent) mattresses.

Trenching for the offshore (subsea) pipeline will take place between MP12.50 and MP14.02. One clamshell dredge with an environmental bucket and its supporting scows will be mobilized to first excavate a pit at the offshore HDD exit point for the Morgan Shore Approach HDD crossing, then proceed eastward to excavate a trench from the offshore HDD exit pit to approximately MP16.60; the portion of the trench within New Jersey waters ends at MP14.02. The bottom of the trench in this area will extend to a minimum depth required for safe installation of the pipeline, as directed by the USACE. The pipelay barge will then be moored at MP14.50, as the limited working water depths make it infeasible for the pipelay barge to enter the waters to the west of MP14.50. At MP14.50, the pipelay barge will feed out the pipeline string for MP12.50 through MP14.50, and the Morgan Shore Approach HDD string.

For the Morgan Shore Approach HDD string, a combination of the pipelay barge and a temporary fixed platform (described below) will be used to lay the HDD string and pipeline strings from MP12.50 to MP14.50. The winch wire from the temporary fixed platform will be attached to the HDD string and will pull the pipe as it is paid out from the barge. The temporary fixed platform will provide a solid foundation needed to withstand the anticipated pull-in loads of the pipe strings. Buoyancy modules will also be installed on the HDD string during this process. The tail end section of the HDD string will be transferred to a tug, so that the pull-in winch on the temporary fixed platform can pull the HDD string until it reaches the required location. Once in place, the buoyancy modules will be removed from the HDD string to allow the string to lay down in the trench, where the string will be flooded to provide on-bottom stability until it is ready to be pulled through the pre-drilled HDD hole.

The 2-mile section of pipe from MP12.50 to MP14.50 will be installed using the same methods, without the tug connected to the tail end. Rather, the pipelay barge will remain connected to the tail end of the pipe string as it is paid out, and the pipeline will be directly laid down within the trench upon removal of the buoyancy modules.

Transco will use a jet barge at approximately MP30.40 and proceed eastward toward MP30.64 to cut and remove existing, inactive cables. If Transco identifies any additional active cables during construction, divers will remove sediment covering the cable and install concrete mattresses on either side of the cable to create a bridge above it.

Following assembly and installation of the Ambrose Channel HDD described below, an anchored pipelay barge will begin laying pipe on the seafloor beginning at MP29.52 (New Jersey), extending in a westerly direction to approximate MP16.60 (New York). Divers will measure the distance between the end of the previously laid pipe section discussed above at approximate MP16.60 and the newly laid pipe; subsequently, a tie-in spool will be fabricated and installed to connect the two sections. After Transco has laid the pipeline segment, a jet trencher will be used to lower the pipeline, and the clamshell dredge will be used to backfill the trench. The anchored pipelay barge will then relocate to lay pipe on the seafloor east of the Ambrose Channel entry HDD point, toward MP35.49 (New Jersey), after which a jet trencher will be used to lower the pipeline.

5.2.2 HORIZONTAL DIRECTIONAL DRILL – MORGAN SHORE APPROACH

The Morgan Shore Approach HDD will be installed using the HDD method described for the Madison Loop, above, with additional offshore steps described below. A section of pipeline will be pulled through the pre-drilled HDD hole from the subsea exit point at approximately MP12.50 to the onshore HDD entry point at approximately MP12.00 and connected onshore with the proposed Madison Loop.

For the Morgan Shore Approach HDD, Transco will mobilize a marine-support barge loaded with the HDD equipment and crew to the HDD exit point location in Raritan Bay. A clamshell dredge with an environmental bucket will excavate the exit point, and then a vibratory device will be used to install piles ("goal posts") at the exit pit. Following drilling, reaming, and swabbing of the borehole, the HDD pipe string will be pulled through the borehole toward the onshore HDD entry point. All offshore HDD activities will take place 24 hours per day, seven days per week, while activities associated with rigging up at the onshore entry workspace will take place during daylight shift.

The Morgan Shore Approach temporary fixed platform will provide approximately 4,600 square feet of deck space and will require the use of a crane barge to lift and install piles and trestle girders, a material barge to transport and store installation components, and a location barge to provide installation support. See Waterfront Development Permit Plans for the Raritan Bay Loop, sheet 7 for a depiction of the temporary fixed platform. Major deck equipment on the temporary fixed platforms will include the HDD drill rig, a small crane, a pull-in winch, contingency generator, sheaves, and light packs. Additionally, the fixed platforms will be equipped with solar navigation lights on the corners. The temporary fixed platforms will remain in place for the duration of HDD activities between June 2027 and August 2027, for approximately 50 days. To date, Transco has consulted with the USCG, National Oceanographic and Atmospheric Administration (NOAA), and Harbor Operations Steering Committee regarding this modification of the planned installation methods for the Raritan Bay Loop, as noted below. The meetings were held as follows: USCG on August 15, 2017, and February 26, 2018; Harbor Operations Steering Committee on October 4, 2017, and April 4, 2018; and

NOAA on February 7, 2018. Transco will continue to consult with appropriate agencies regarding the installation and use of a temporary fixed platform at the Morgan Shore Approach offshore HDD pit.

5.2.3 HORIZONTAL DIRECTIONAL DRILL – AMBROSE CHANNEL APPROACH

For the Ambrose Channel crossing, Transco will mobilize a clamshell dredge with an environmental bucket mounted on a crane barge and two liftboats with drilling equipment to the Lower New York Bay. Transco will use the intersect method to cross the Ambrose Channel, as described above.

The Ambrose HDD pipe string will be fabricated and positioned offshore. This prefabricated HDD string will be hydrotested and remain parked on the seabed awaiting pull-back into the reamed HDD hole. The 5,875-foot Ambrose HDD string will consist of the length of the approximately 4,655 feet of HDD pipe, a 1,140-foot "tail" length to allow S-lay retrieval and continuation of pipelay by the lay barge once the pull-in is completed, and an additional 80-foot length of pipe to allow for the tie-in on the east side of the HDD.

In order to temporarily stabilize the HDD string, Transco will install up to 11 pairs of 24-inch piles along the alignment of the Ambrose Channel HDD string from the Ambrose Channel HDD east pit extending approximately 6,375 feet eastward prior to laying of the Ambrose Channel HDD string. Each pair will be installed approximately 30 feet offset to the proposed centerline of the Ambrose Channel HDD string, at an elevation of approximately 3 to 4 feet above the seafloor. Following installation of the anchor piles, the pipe string will be laid on the seafloor between the piles and then affixed to the piles using soft slings and chains to keep the Ambrose Channel HDD string in place prior to pullback. See Waterfront Development Permit Plans for the Raritan Bay Loop, sheets 3, 5, and 8 for a depiction of the pile configuration. Installation of the piles is outlined in **Table 4**. Prior to pullback of the HDD string, the slings will be cut, and the slings and chains affixing the pipe string to the piles will be disconnected. Following the successful installation of the Ambrose Channel HDD, all 11 pairs of piles will be removed.

Transco will conduct the Ambrose Channel HDD, including drilling, reaming, and swabbing of the borehole, 24 hours per day, seven days per week, until completion. During the Ambrose Channel HDD, an anchored lay barge will be set up near the Ambrose Channel HDD exit point to assemble the HDD pipe string, lay the pipe string near the HDD pit (east), and then complete a hydrostatic test of the pipeline segment. Following drilling, reaming, and swabbing of the borehole, Transco will remove the casing and pull the pipe string through the borehole.

5.2.4 HORIZONTAL DIRECTIONAL DRILL – CATHODIC PROTECTION (CP)

The installation of the CP system will require two HDDs, both in New Jersey. The first will begin at MP12.10 and end approximately 1,200 feet from the pipe centerline seaward of the Morgan shoreline in Sayreville, New Jersey, north of MP12.35. Transco will mobilize a marine support barge to the HDD exit point location in Raritan Bay to the north of MP12.32, and a dredge will excavate the area where the anode sled will connect to the CP power cable. Following drilling of the borehole, the CP power cable will be pulled through toward the onshore HDD entry point. The offshore HDD activities will take place 24 hours per day, seven days per week, until the HDD is complete, while activities associated with rigging up at the onshore entry workspace will take place during daylight shifts. Following completion of the HDD, the anode sled will be installed and backfilled to a minimum depth of 4 feet. Following completion of the CP HDD east of MP12.10, a second onshore CP HDD will begin, starting at MP12.10 and ending near the junction between the Raritan Bay Loop and Madison Loop at MP12.00. The activities associated with the onshore drilling will take place 24 hours per day until the HDD is complete, while activities associated with rigging up at the onshore entry workspace will take place during daylight shifts.

5.2.5 BACKFILL

For any supplemental offshore backfill activities, selected material will be predominantly sandy and have only a limited amount of silt and clay, which will help ensure stability and minimize deposition outside of the target backfill area. Transco has been advised that enough suitable material can be commercially obtained from Ambrose Channel seaward

of the Raritan Bay Loop to fulfill Project needs for offshore supplemental backfill. This material will be acquired from one or more existing commercial vendors that currently operate under active permits to dredge Ambrose Channel. As reflected in the example permits, the portion of Ambrose Channel that can be dredged for the Project by such a vendor has the demonstrated material availability and suitability (e.g., less than 5% silt/clay, suitable for placement at the HARS or at other in-water restoration site, as described below) for backfill. The dredging may be conducted with equipment that includes, but may not be limited to, a self-loading hopper barge and a (mechanical) clamshell dredge.

Transco expects the material from the Ambrose Channel to be suitable for placement as backfill at the HARS and requests NJDEP's concurrence that no further testing for contaminants is necessary based on the following information:

- Per the April 2016 USACE and U.S. Environmental Protection Agency (EPA) Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal, material tested from the designated channel identified as having less than 12% fine sediment (i.e., silt and clay passing the #200 sieve) is considered HARS-suitable without further testing.
- Samples for material collected from the proposed Ambrose Channel site in 2000 contained 90% to 97% sand, with only 0% to 3% fine sediment and 0% to 10% gravel (passing the #4 sieve) (USACE 2000). Transco collected core boring samples from Ambrose Channel in late 2016 approximately 0.75 mile shoreward (northwest) of the proposed Ambrose Channel backfill source site; these samples indicate that the sediment consists of predominantly medium dense to dense sand with less than 10% fine sediment to depths of at least 30 feet (and up to 60 feet) below the channel bottom.
- The vendor would only obtain backfill material from within previously evaluated dredge prisms (i.e., previously authorized channel dredging dimensions).

Transco would account for Project impacts from the time when Project-dedicated scows have been loaded with material for placement as backfill and acknowledges that these activities, including placement of supplemental backfill, would continue to be subject to review and approval as part of the federal and state permitting processes.

After the pipe has been laid in the trench, the clamshell dredge will backfill the trench between the Ambrose Channel exit HDD point and approximate MP16.6 and between the Ambrose Channel HDD entry point and MP35.49 (New York tie-in location). The three offshore HDD pits will be backfilled with clean, compatible material that has a grain-size distribution suitable for preventing re-suspension under typical current conditions at these sites. Transco will bury the pipe to a minimum depth of 4 feet and will restore the excavated offshore areas by backfilling to match surrounding contours, consistent with any permit requirements. Supplemental backfill will be used as needed following completion of commissioning activities. Transco will use a clamshell dredge for supplemental backfill activities.

Following completion of backfilling, Transco will conduct a post-construction survey of the entire route to identify and address areas that may require supplemental backfill, including jet-trenched segments. Similar to the Rockaway Delivery Lateral Project in New York waters, which has a 5-year post construction survey requirement, Transco will also resurvey the entire Raritan Bay Loop route at routine intervals to determine if the route requires further supplemental backfill.

6.0 PROJECT PURPOSE

Transco is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters. The purpose of the Project remains consistent with the 2020 applications – to provide 400,000 dekatherms per day of incremental firm transportation capacity from Transco's Station 195 in York County, Pennsylvania, to the existing Rockaway Delivery Point (located approximately three miles offshore of the Rockaway Peninsula in Queens Borough, New York) to serve the Brooklyn Union Gas Company, d/b/a National Grid NY, and KeySpan Gas East Corporation, d/b/a National Grid (collectively, National Grid or Project Shippers).

By way of background, Transco previously executed binding precedent agreements with the Project Shippers for 100% of the firm transportation service to be provided under the Project. The Federal Energy Regulatory Commission (FERC) ultimately issued a certificate of public convenience and necessity on May 3, 2019, which was amended by an Order Amending Certificate, dated July 16, 2020 (collectively, "Certificate Order"). However, given the permit denials in 2020 by the New York State Department of Environmental Conservation (NYSDEC) and New Jersey Department of Environmental Protection (NJDEP), and the eventual lapse in the Certificate Order, the precedent agreements were terminated in accordance with their terms.

Despite the lapse in the Certificate Order, the need for the Project, including the more affordable and reliable energy it can make available to New York, has only increased over the last six years. Reliability concerns continue to plague downstate New York and the urgent need exists for additional natural gas supply to serve families and businesses in the region. Projects that were anticipated to obviate the need for the Project have not come to fruition while demand continues to grow in New York.

As highlighted in the Northeast Power Coordinating Council's (NPCC) *Northeast Gas/Electric System Study*, existing gas infrastructure in New York is unable to meet the demand for most electric generators during a cold snap.[5] The same is true for extreme heat waves. While many generators in downstate New York—where the Project is intended to serve—are dual-fuel capable, very few electric generators have firm transportation entitlements, exposing electric generation to risk in the event of an extreme weather event or a pipeline outage.[6] The addition of new firm transportation capacity would immediately improve the resiliency and reliability of gas service to residential and commercial loads—and help to reduce gas prices—in New York City, including during peak demand days. It would also reduce the need for electric generators to rely on oil as a backup.

This fact is reinforced by the President's Executive Order, *Unleashing Energy* and *Declaring a National Energy Emergency*, issued on January 20, 2025. The urgent need for energy transportation infrastructure must be met, as detailed in the Executive Order, with actions to facilitate and support infrastructure development, including the permitting and construction of interstate pipelines—particularly in regions lacking such development in recent years—i.e., the northeastern United States. This is why the Administration is looking to New York, as well as New Jersey and Pennsylvania, to permit the Proposed Project without delay.

For these reasons, Transco and the Project Shippers reinstated the precedent agreements in their entirety in 2025. Just as before, these precedent agreements represent 100% of the firm transportation capacity created by the Project, which show strong market need for the Project. Accordingly, FERC reissued the Certificate Order on August 28, 2025 authorizing Transco to construct and operate the Project

5 Northeast Power Coordinating Council, *Northeast Gas/Electric System Study*, at 5 (Jan. 21, 2025).
6 *Id.* at 5-6.

7.0 PROJECT BENEFITS

The Project will have benefits to the natural gas supply system as well as environmental and economic benefits. The Project will enhance the reliability of the local, state, and regional natural gas supply system and is designed to improve public health and enhance the environment by improving existing air quality, replacing less environmentally friendly fuels such as heating oil, and integrating an impact avoidance and minimization premise into all Project component siting and design while mitigating any remaining impacts to the surrounding environment. The existing Transco system delivers one half of the natural gas consumed in the Garden State and the Project improves the reliability/resiliency of the system in New Jersey, and therefore benefits local residents and businesses. The system has reliably served New Jersey since 1951 providing fuel to heat and cool homes, cook food, and address other basic public needs.

- The New Jersey facilities will provide enhanced system flexibility during planned and unplanned maintenance activities on Transco's natural gas infrastructure within the State.
  - The Project is designed to provide 400,000 Dth/d under peak conditions, however, shippers (especially local distribution company type shippers) do not typically require their full contractual volume except during an abbreviated time period during extreme weather conditions. Under normal conditions, the facilities constructed as part of the Project will enable Transco to manage maintenance outages and repairs; thus, minimizing impacts or interruption to all shippers on the system, especially those in New Jersey.
- In the event that the permits for the Project are denied and the Project is not constructed, the anticipated increase in the average system utilization off of the Transco system could result in material degradation of delivery pressures at existing delivery points and increased challenges associated with delivering existing firm shipper entitlements in New Jersey.
  - Without the Project, utility providers would continue signing up customers to their service territory because they are obligated by the New York State Public Service Commission to provide safe, reliable energy service upon request.
  - This could, in turn, result in an increase in the normal load from the interstate pipeline transmission grid, resulting in an overall increase in average deliveries off the Transco pipeline system in New Jersey.
  - An increase in the average system utilization would lead to increased operational challenges related to the scheduling of maintenance activities and a greater chance of impacts to all shippers in the northeast region, including those in New Jersey.
  - As noted in Transco's Alternatives Analysis for the Project (see **Appendix C** of the **Environmental Report**), the purpose of the new CS 206 is to offset the pressure drop associated with transporting the additional volume of natural gas flowing through the pipeline.

The Project has economic benefits to the State and local communities. Transco's formal economic impact study concluded that the Project would, in 2020 dollar equivalents:

- Generate approximately $240 million in additional economic activity (GDP) in New Jersey,
- Support more than 2,400 local New Jersey jobs and 3,186 regional jobs during the project construction period. Generating approximately $172 million in potential income for New Jersey workers,
- Add $418,300 in local tax revenues in Somerset County and $16 million total in new local and state tax revenue,
- Have minimal impact on surrounding neighbors and the environment. In its proposed location the facilities will be largely out of sight, with virtually zero impact on noise or air quality.

FERC analyzed these economic impacts of the Project and concluded in the FEIS that the Project would have beneficial economic effects on state and local economies. FERC specifically found that the Project will create "a short-term stimulus to the affected areas through payroll expenditures, local purchases of consumables and project-specific

materials, and sales tax" and that "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." (Final EIS, p. 4-278).

In addition, the Project will result in more than double the permanent offset of temporary construction emissions and the ongoing operational emissions at Compressor Station 206, a significant health and safety benefit to the surrounding area in New Jersey:

8.0 ALTERNATIVE ANALYSIS

A New Jersey Alternative Analysis was prepared in January 2020 and revised in February 2020 to identify and evaluate alternatives that have been considered for the proposed NESE Project. This report discusses alternatives Transco evaluated in relation to its own system; Raritan Bay Loop alternatives; compressor station and compressor station site alternatives; and compression alternatives. The information contained in the Alternative Analysis was obtained from field surveys, desktop reviews of available literature, stakeholder input, and publicly available information regarding existing pipeline infrastructure. Please note that Transco's Alternatives Analysis includes a discussion of, and responses to comments and recommendations made by NJDEP to evaluate alternatives to the Project. A complete copy of the Alternative Analysis is included as **Appendix C**.

8.1 EVALUATION OF SITE-SPECIFIC AVOIDANCE AND MINIMIZATION MEASURES 2017 - 2018

As a result of NJDEP's review of Transco's initial permit application for the Project, dated June 2017, Transco evaluated a number of site-specific avoidance and minimization measures. The following information reflects Transco's responses to NJDEP requests for further avoidance and minimization measures (see **Appendix A** for a copy of NJDEP's technical deficiency letter on Transco's initial permit application for the Project dated July 17, 2017).

Comment C: At various locations along the Madison Loop, work areas between 75 and 90 feet in width are proposed, resulting in additional impacts to wetlands, state open waters, riparian zones and transition areas. Previous underground pipeline projects have successfully incorporated 50-foot-wide work areas. Please reduce the width of workspace areas accordingly.

Response C: In previous Transco projects, where applicable and based on site-specific conditions, workspace reductions have been implemented in areas such as Category 1 waterbodies and exceptional value wetlands.

For the NESE Project, Transco has proposed a standard 90-foot-wide construction ROW for the installation of the Madison Loop. Typically, linear natural gas projects reduce the standard construction ROW to 75 feet at wetland and waterbody crossings. As such, Transco has reduced the proposed construction ROW to 75 feet for all wetland and waterbody crossings where open-cut construction is proposed. Workspace narrowing was not practicable at a number of wetland crossings because Transco either proposes to cross these features via HDD, or crossings are limited to facility workspaces or ATWS, or the features are contained entirely within the workspace. Additionally, Transco elected to continue the 75-foot reduction through riparian zones and transition areas to further reduce impacts on NJDEP-regulated features.

In addition, several areas along the Madison Loop contain Type C soils, which are non-cohesive sandy soils. Due to the non-cohesive nature of Type C soils, trench walls must be sloped to prevent trench collapse. A 75-foot construction ROW is required to mitigate these conditions.

Transco also considers the safety of the construction contractor's personnel who will be installing the pipeline. Large equipment is required to install a 26-inch-diameter pipeline, and a 50-foot construction corridor severely restricts the contractor's ability to maneuver equipment and personnel to complete the installation while keeping construction personnel safe. Within the reduced 75-foot-wide

construction ROW, the proposed working side of the ROW (equipment side) is no more than 45 feet wide. This nominal workspace allows for safe passage of equipment and personnel. Additionally, a 45-foot working side allows for more efficient installation, thus decreasing the time of construction in regulated areas.

Therefore, due to constructability considerations and safety concerns, reduction of the construction ROW as presented is not feasible for installation of the Madison Loop.

Comment D: At Utility Crossing locations 8.61 and 8.69-8.77, sheet 3 of the wetland plans an open trench cut method of installation is proposed. Could jack and bore techniques be used at these locations to further minimize impacts?

Response D: The overall duration of impacts on environmental features (waterbodies and wetlands) at MP8.61 and MP8.69 – MP8.77 will be considerably reduced by utilizing the conventional open-cut method as proposed. Transco estimates that it will take less than 24 hours (one day) to install the proposed pipeline through each waterbody crossing in this area (WW-T01-001 and WW-T01-002). Transco is proposing to utilize the same "dry-crossing" methodology that was employed for the open-cut crossing of stream WW-T01-002, which was completed in March 2017 as part of Transco's Lower New York Bay Expansion Project (NJDEP FWW/Flood Hazard Area [FHA] Authorization 1200-16-000.1). In a "dry-crossing" steel plate or sandbag dam is installed upstream and downstream of the area to be excavated and water accumulated on the upstream side of the isolation barrier is pumped to the downstream side of the isolation barrier, thus creating a bypass of the stream flow while excavation operations are taking place. It should be noted that both streams WW-T01-001 and WW-T01-002 have minimal to zero flow, and wetland W-T01-003C-1 is of intermediate resource value. Therefore, the overall impacts associated with conducting a conventional open-cut will be minimal. As evidence of the flow characteristics of these waterbodies, see the Wetland Delineation Report provided with this permit application, which provides photo documentation of the flow characteristics of these waterbodies.

In contrast to the "dry-crossing" methodology described above, implementing a conventional boring installation across stream WW-T01-001 and stream WW-T01-002/wetland W-T01-003C-1 would require the contractor to perform the following tasks over a 10 to 12-day period:

- Perform deep excavations to allow for proper placement of boring equipment (two to three days);
- Placement of required boring equipment in a safe manner (two days);
- Conduct boring operations (two days);
- Weld 26-inch carrier pipe to boring pipe (one day);
- Pull 26-inch carrier pipe through bored hole and weld on transition fittings (one day); and
- Remove boring equipment from excavated bore pits, backfill, and stabilize excavation area (two to three days).

Additionally, the contractor would have to continuously remove water that infiltrates the deep excavations to allow for safe boring equipment to be installed. Water removal will require pumping, filtration, and eventual discharge through environmental-control devices located near the installation area, or additional workspace for containment may be needed.

Based on the summary above, utilizing conventional boring installation methods would extend the duration of impact and also increase the overall impacts at stream WW-T01-001 and stream WW-T01-002/wetland W-T01-003C-1.

Comment E: The temporary workspace location MP8.88, sheet 3 of the wetland plans extends over a regulated watercourse and into a wetland before connecting to the adjacent access road. Please minimize this impact by limiting the workspace area.

Response E: The temporary workspace near MP8.88 extends over waterbody WW-T01-002, wetland W-T01-003, and the associated riparian buffers and transition areas. This temporary workspace is required for pipe stringing and pullback for the proposed Cheesequake Road HDD. Once the drilling portion of the HDD is complete, the pipe to be installed is staged in a "string" so that the pipe is "pulled" or installed in the drilled hole.

HDD pullback activities require continuous operation to reduce the risk of the HDD pipe becoming lodged in the borehole. If possible, the pipeline is pulled in one segment to avoid halting pullback operations to complete the tie-in welds needed for multiple stringing of sections. To reduce impacts on wetlands W-T17-002A-3 and W-T15-001A-1, Transco has minimized the length of workspace for pipe stringing and pullback of the Cheesequake Road HDD by proposing to complete the pipe stringing and pullback in three stringing sections. Further reduction of the HDD workspace to shorten the pipe stringing area will introduce additional stringing sections and tie-in welds during pullback, adding risk to the proposed HDD. Additional stringing sections will also require a wider workspace; therefore, Transco has minimized the workspace for the pipe stringing and pullback of the Cheesequake Road HDD to the maximum extent practicable.

Comment F: Can the trench for the utility crossing located at MP8.90, wetland sheet 4, be shifted southeast to eliminate the impact to the wetland. Additionally, the temporary access road into the HDD work area can be relocated to the southeastern edge of the work box for a shorter road.

Response F: The proposed alignment at MP8.90 minimizes the need for additional permanent ROW to the maximum extent practicable. If the alignment were to be shifted southeast, the distance between the proposed loop and the existing pipeline would increase, thus expanding the permanent ROW in this area and increasing forested impacts.

The majority of the access road from Cheesequake Road to the Cheesequake Road HDD exit point, as proposed, is located within Transco's existing ROW. The access road provides ingress and egress to both the construction ROW and the Cheesequake Road HDD exit point. Relocation of the access road to the southeastern edge of the Cheesequake Road HDD exit point workspace would eliminate direct access to the construction ROW during HDD operations. Additionally, relocation of the access road would be outside Transco's existing ROW and would impact a forested area.

Comment G: The HDD temporary workspace, Utility Crossing MP9.20-9.32, wetland sheet 5, impacts wetlands, state open waters, riparian zones and transition areas. There are areas adjacent to the HDD workbox located to the south that appear to have no regulated areas. Please relocate the temporary workspace out of the regulated areas. Additionally, the underground gas line to the west of this location and to the east of this location will be directionally drilled. Is it possible to directionally drill this location as well, eliminating the need for the work areas?

Response G: The proposed temporary workspace crossing the features from MP9.20-9.32 is required for pipe stringing and pullback for the proposed Parkwood Village HDD. Relocating this workspace south, outside of the regulated areas, would require the HDD pipe to be strung at a radius that is less than industry standard or placed into a combination curve. Both options would introduce additional stresses on the pipe and would require a larger workspace in a forested area to safely operate the additional equipment needed to handle such conditions.

Adding an HDD to install the pipeline segment between the two proposed HDDs (Cheesequake Road HDD and Parkwood Village HDD) would require workspace in the same areas for the HDD pipe

string, pullback, and exit. Therefore, the need for the proposed workspace between MP9.20 and MP9.32 would not be eliminated. Furthermore, an HDD alignment for this segment cannot follow the same curvature that is currently proposed, which minimizes the need for additional permanent ROW to the maximum extent practicable. However, Transco has minimized impacts on the isolated wetland W-T15-002A-1 by reducing temporary workspace at MP9.32. The impacts have been reduced by 0.018 acre as shown in the plan sets.

Comment H: Utility Crossing MP10.05-10.19, wetland sheets 8 and 9 will be an open cut trench installation. Please consider using jack and bore or HDD installation techniques to further minimize impacts to regulated areas.

Response H: An open-cut installation of stream WW-T01-002 at MP10.05 will be necessary in order to remove a segment of existing Transco pipeline that has been temporarily abandoned as part of Transco's Lower New York Bay Expansion Project. This project consisted of the offset and replacement of the existing Lower Bay Loop "C" pipeline between MP10.02 and MP10.28. Since Transco's proposed Madison Loop will also cross the stream at MP10.05, Transco temporarily abandoned approximately 150 feet of the replacement segment in this area in order to minimize the width of in-stream disturbance during the replacement. The proposed open-cut installation will allow Transco to install the Madison Loop entirely along the same alignment that had been used previously for the Lower Bay Loop "C" pipeline between MP10.02 and MP10.28. Because a segment of existing Transco pipeline is proposed to be removed at this location, Transco did not assess a conventional bore for stream WW-T01-002 and proposes to utilize the "dry-crossing" methodology described in item (d.), above.

Implementing a conventional boring installation methodology across wetlands W-T01-014A-1 and W-T01-014C-1 would require additional workspace within the adjacent wetlands for continuous pumping of water to allow for a dry and safe bore pit. The deeper excavations required for the bore pits would all be within regulated areas because the transition areas of wetlands W-T01-014A-1 and W-T01-014C-1 is 150 feet. The overall duration of impacts on wetlands W-T01-014A-1 and W-T01-014C-1 will be reduced by utilizing the proposed conventional open-cut method rather than conventional boring methodology.

An HDD to install the pipeline segment between MP10.05 and MP10.19 would require a significant amount of additional workspace in forested areas. Because the slopes on either side of this segment are steep, a significant amount of earth material would have to be removed to safely support HDD stringing and pullback operations. Based on the summaries above, using trenchless installation methods would extend the duration of impact and increase the overall impacts. Therefore, Transco is proposing to utilize the same open-cut methods that were employed for stream WW-T01-002 and wetlands W-T01-014A-1 and W-T01-014C-1 crossed in March 2017 as part of Transco's Lower New York Bay Expansion Project (NJDEP FWW/FHA Authorization 1200-16-000.1).

Comment I: The installation path used on wetland sheet 9 impacts the edge of the adjacent wetland. Could the gas line be shifted further north 20-50 feet to minimize this impact area?

Response I: An alignment shift 20 to 50 feet north would result in a significant increase of forest impacts and would increase the distance between the proposed loop and the existing pipeline, thus expanding the permanent ROW. The alignment as currently proposed will not require any additional permanent ROW between MP10.17 and MP11.15.

Comment J: Open cut trench installation is proposed at Utility Crossings MP10.69-10.94, on wetland sheets 11 and 12. Given the length of these crossings and the impacts associated with them combined, why was DD installation not considered?

Response J: An HDD to install the pipeline segment across the storm water detention basin between MP10.69 and MP10.94 would require a significant amount of additional workspace in forested areas. Because slopes on either side of this segment are steep, a significant amount of earth would have to be removed to safely support HDD stringing and pullback operations, thus increasing the duration of construction significantly.

8.2 Evaluation of Site-Specific Avoidance and Minimization Measures 2018 - 2019

In response to NJDEP Division of Fish and Wildlife (DFW) Endangered Species and Nongame (ENSP) Program's acceptance of a report of the barred owl (*Strix varia*) which resulted in the reclassification of (PFO) wetlands on the Compressor Station 206 site from intermediate resource value wetlands to exceptional resource value wetlands per N.J.A.C. 7:7A-3.2(b) in April 2019, Transco undertook additional detailed engineering to further reduce the impacts to the exceptional value forested wetland transition areas for construction of Compressor Station 206 and siting of the stormwater infiltration basin. Specifically, basing calculations on field-verified soil types and modifying the impervious surfaces within Compressor Station 206 allowed the footprint of the infiltration basin to be further reduced, resulting in no impacts to exceptional value wetland transition areas by the infiltration basin footprint. To further reduce impacts to exceptional value wetland transition areas, the limits of disturbance were adjusted along the eastern boundary of the Compressor Station 206 site. Impacts to exceptional value wetland transition areas along the eastern boundary of the site were eliminated.

In response to NJDEP's technical deficiency letter for Transco's June 2019 FWW IP Application dated June 25, 2019, Transco modified the Compressor Station 206 limits of disturbance at the southern corner of the compressor station facility to further reduce exceptional value transition area impacts by an additional 0.075 acre. With this change Transco has eliminated impacts to exceptional value transition areas as a result of the compressor station facility footprint (see the Freshwater Wetlands Permit Plans).

As described above, in response to NJDEP's November 27, 2019 letter outlining regulatory deficiencies associated with Transco's June 12, 2019 application for a FWW IP, is now proposing an access road on an adjacent parcel to eliminate impacts to wetlands and waterways associated with the previously proposed access road. As a result of the change in access road, permanent impacts on wetlands have been reduced by 2.859 acres.

9.0 AVOIDANCE AND MINIMIZATION

The design and placement of the new pipeline and compressor station were engineered with an understanding of the importance of avoidance and/or minimization of impacts to regulated areas. Further efforts to minimize regulated impacts associated with the Project include:

9.1 Madison Loop

During development of the Project, Transco implemented several measures related to Project routing, workspace design, and construction methods to avoid and minimize impacts to regulated features. Transco minimized impacts by co-locating the pipeline facilities with Transco's existing right-of-way (ROW) to the maximum extent practicable. In general, Transco maintains a 25-foot offset between co-located pipelines. This offset allows for safe construction adjacent to the existing pipeline and allows for rights-of-way to overlap, reducing the overall impact. In general, attempts to re-route the pipeline around regulated features increases impacts as the benefit of co-location with existing, previously disturbed areas is lost. Co-location also consolidates the disturbance across private property, thereby reducing impacts to property owners.

Transco narrowed workspaces from 90 feet wide to 75 feet wide at wetland crossings and waterbody crossings within the Project area. Workspace narrowing was not practicable at a number of wetland crossings because Transco either proposes to cross these features via HDD, or crossings are limited to facility workspaces or ATWS, or the features are contained entirely within the workspace. Transco also avoided placing ATWS within wetlands and forested areas, where practicable, to minimize impacts.

Transco has also completed several minor workspace adjustments to avoid or minimize wetland impacts. Transco has revised the limit of disturbance around wetland W-T07-001 to avoid impacts to the feature and has modified ATWS to reduce impacts to wetlands W-T01-007, W-T01-014, W-T07-004, and W-T15-002, and the associated transition areas.

Impacts to the riparian zone were minimized to the greatest extent practicable. The overall Project will result in both temporary and permanent impacts to the riparian zone. A large majority of the proposed impacts are temporary and/or will occur in actively disturbed areas. Temporary impacts will be a result of construction access, including roads and workspace areas located outside the permanent easement, and HDD operations. Additionally, a significant portion of the proposed Madison Loop pipeline will be installed via HDD, which will reduce or eliminate impacts to stream channels, riparian zones, and wetlands. Permanent impacts will be associated with the widening and ongoing maintenance of the pipeline easement. The proposed Project will incorporate SESC measures and best management practices, including but not limited to the installation of silt fence, dewatering structures, check dams, ditch plugs, sediment barriers, timber equipment mats, and temporary stream crossings (see Sheets 17 through 20, Construction Details, of the Madison Loop Plan Set).

Transco has also completed several minor workspace adjustments to avoid or minimize impacts to regulated features. Transco has revised the limit of disturbance west of Gondek Drive, which has eliminated impacts to the stream channel of WW-T07-001 and has reduced workspace parallel to stream WW-T01-002B to maintain offset from the stream channel and reduce riparian zone impact.

Lastly, Transco relocated a pipeline crossover to eliminate the need for new permanent ROW within an NJDEP conservation easement (MP11.23 to MP11.42). Transco reduced the standard permanent ROW width for the Madison Loop near Gondek Drive, thus eliminating a total of 0.02 acre of permanent ROW within the conservation easement. Additional adjustments were made to relocate all temporary workspace outside of the conservation easement, eliminating impacts to the conservation easement altogether.

9.2 COMPRESSOR STATION 206

Transco has designed the facility to eliminate impacts to regulated features (including wetlands, wetland transition areas, waterbodies, and riparian areas) within the footprint of the onsite facility and associated access road. Impacts to regulated features associated with the Compressor Station 206 site are restricted to activities related to tying the facility into the existing Transco pipeline in this area.

In response to NJDEP's November 27, 2019 letter outlining regulatory deficiencies associated with Transco's June 12, 2019 application for a FWW IP, Transco is proposing an access road on an adjacent parcel to eliminate impacts to wetlands and waterways associated with the access road. Transco's proposed access road (Higgins Farm access road) will generally overlap the pre-existing access road, now utilized by EPA to reach a groundwater treatment plant and will be extended to service Compressor Station 206 during construction and operation of the facility. In designing the Higgins Farm access road, Transco committed to eliminate impacts to NJDEP regulated wetlands and waterbodies associated with the Compressor Station 206 access road.

Transco has also minimized the overall wetland impacts associated with the suction and discharge piping and tie-in, to the maximum extent practicable. Typically, the ROW width to install suction and discharge piping ranges from 100 to 120 feet. At Compressor Station 206, Transco has reduced the construction ROW width for "Utility Crossing D" to 80 feet. Additionally, in response to NJDEP comments, Transco has reduced the impacts of Utility Crossing D by redesigning the suction and discharge piping workspaces to reduce the length from approximately 700 to 550 feet. Locating the tie-in entirely outside of wetlands is infeasible due to the proximity requirements of the tie-in to the compressor station and MP range where the tie-in must be sited as described further in the Alternatives Analysis included as **Appendix C**. However, although the tie-in was sited within a wetland, the associated workspace was sited in an adjacent upland area, to the maximum extent practicable.

Finally, in response to the reclassification of portions of the PFO wetlands in April 2019 within and adjacent to the compressor station site as "exceptional" resource value wetlands, Transco has redesigned the infiltration basin and further reduced the limits of disturbance of the suction and discharge piping and tie-in to limit transition area impacts.

9.3 Onshore Pipeline Construction Methods

9.3.1 Conventional Boring

Boring is generally not considered at wetland crossings because there are minimal impacts during conventional installation. Additionally, a 10-foot swath of vegetation, directly over the pipeline, would be cleared during construction and maintained during operation and regardless of the construction method used (i.e. boring). Consequently, there would be minimal impact reductions in using a conventional bore when crossing wetlands.

For streams, Transco evaluates the stream's classification to determine if it is ephemeral, intermittent, or perennial. Intermittent and ephemeral streams are generally not considered suitable for boring because there are minimal impacts during conventional installation. Crossing is typically completed within 24 hours and overall impacts are reduced when compared to conventional boring as additional extra workspace is required to store material excavated for the bore pits.

9.3.2 Horizontal Directional Drilling

For wetlands, the total acreage of PFO wetland impact at the crossing was considered. If the impact exceeds one acre, workspace is developed for a potential HDD. No wetlands had PFO impacts greater than one acre.

9.3.3 Pipeline Stringing

The two stringing sections will be pre-fabricated parallel to each stringing section within the identified stringing area workspace prior to pullback. A pre-fabricated pull head will be welded to the leading end of the stringing section in line with the HDD alignment. The first stringing section with the pull head attached will be pulled into the enlarged hole by a drill rig at entry, and pullback will be halted at a predetermined point to relocate the second stringing section in line with the first stringing section to make a tie-in weld between the two stringing sections. After the tie-in weld is complete, has been coated, x-rayed, and passed inspection, pullback operations will resume until the stringing section has been pulled back to the drill rig at entry. Single string-back is preferred, however due to space constraints was not feasible due to workspace constraints. Adding a third string to the HDD add risk to the HDD design as HDD operations are required to be halted a second time to make another tie-in weld between the stringing sections.

9.4 HDD Entrance and Pullback Locations

9.4.1 Lockwood Marina

An alternative entry location west of Gondek Drive for the Lockwood Marina HDD was analyzed during the preliminary design phase. However, it was determined that the proposed HDD entry point would minimize impacts to the adjacent residential areas located north and south of the ROW (future development). Additionally, an HDD entry point west of Gondek Drive would lengthen the HDD and require an additional stringing section, adding risk to the HDD design. Although the alternative entry location would minimize impacts to wetland W-T07-004D-1, the workspace near MP11.40 would need to increase to provide sufficient space for the HDD entry. The additional workspace required would add impacts to stream WW-T07-001 and wetland W-T07-003A-1.

The workspace proposed south of the Lockwood Marina HDD entry point was reduced as much as possible in order to minimize impacts to wetland W-T07-004D-1 and avoid impact to stream WW-T07-001. Reducing the ATWS MID-052 further would not provide enough workspace to accommodate the HDD activities.

9.4.2 Parkwood Village

A slightly wider ATWS (MID-013) for the Parkwood Village HDD pullback is proposed to level the uneven topography (side slope) along the HDD stringing area.

9.5 BEST MANAGEMENT PRACTICES

A Soil Erosion and Sediment Control Plan has been developed and will be implemented to minimize potential sediment release into environmentally sensitive areas as a result of Project construction activities. All Soil Erosion and Sediment Control practices will be constructed in accordance with the New Jersey Standards for Soil Erosion and Sediment Control, revised July 2017. These measures will be installed prior to any major soil disturbance or in their proper sequence and maintained until permanent protection is established. The following techniques will be employed during construction to minimize the potential for soil erosion and sediment migration:

- Erosion and sediment control BMP measures will be installed prior to commencement of earthwork and will not be removed until after the up-gradient areas are stabilized.
- Stabilized construction entrances will be installed along points of access to the pipeline alignment to mitigate the potential for construction vehicles to transport sediment onto public roadways.
- Silt fence will be installed along the down-gradient perimeter of the work areas.
- At areas of concentrated flow in natural drainage ways, diversion berms will be installed to intercept and convey upslope stormwater runoff around the work corridor without contacting disturbed surfaces.
- Diversion terraces will be installed to mitigate the potential for stormwater to erode soils on steep slopes by diverting water away from the pipeline alignment. Diversion terraces will discharge to a well vegetated area, or an outlet structure to limit the potential for sediment-laden water to flow downgradient from the terrace.
- Trench plugs will be installed intermittently within the pipeline trench to control and allow for managing the flow of sediment-laden stormwater within the trench. Stormwater pooling within the excavation behind a trench plug will be removed and discharged through a pumped water filter bag over stable, undisturbed earth.
- Removal of the erosion and sediment control BMP measures will occur only after the disturbed areas have been stabilized by uniform perennial vegetative coverage (density) of seventy percent (80%) or greater, or by other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements.
- Diligent maintenance of the erosion and sediment control BMP measures will be conducted throughout the duration of the Project.

PART III. EXISTING ENVIRONMENTAL CONDITIONS

1.0 GEOMORPHOLOGY

The Project is located within the Piedmont (Compressor Station 206) and Coastal Plain (Madison and Raritan Bay Loops) physiographic provinces.[7] The Piedmont physiographic province, a vast peneplain of rolling knolls and low ridges extending along the eastern United States from New York City southward to Montgomery, Alabama. This region is a relatively low-lying area of broad valleys and low hills that slope gently in a southeastward direction. The topography is broad lowland interrupted by long trending ridges and uplands. Erosional processes have etched out the present relief of the Piedmont. Sediment eroded from adjacent uplands was deposited along rivers and in lakes within the low-lying areas. These sediments became compacted and cemented to form conglomerate, sandstone, siltstone and shale, with a distinctive reddish-brown color.

The Coastal Plain is underlain by a southeasterly dipping and thickening sequence of unconsolidated sediments which lie unconformably upon a floor of predominantly crystalline rock. These unconsolidated deposits are thick wedges of sands, gravels, clays and silts of the Cretaceous and younger age that were laid down in a deltaic environment and subsequently eroded to the present landform. More recent deposits of Pleistocene sands and gravels and alluvium blanket the Cretaceous rocks, except where outcrops occur, and have little visible effect on the topography between the Coastal Plain Province and the northerly Piedmont Province. Erosion and redeposition have created a level to gently rolling topography, with little relief except near stream channels.

2.0 SOILS

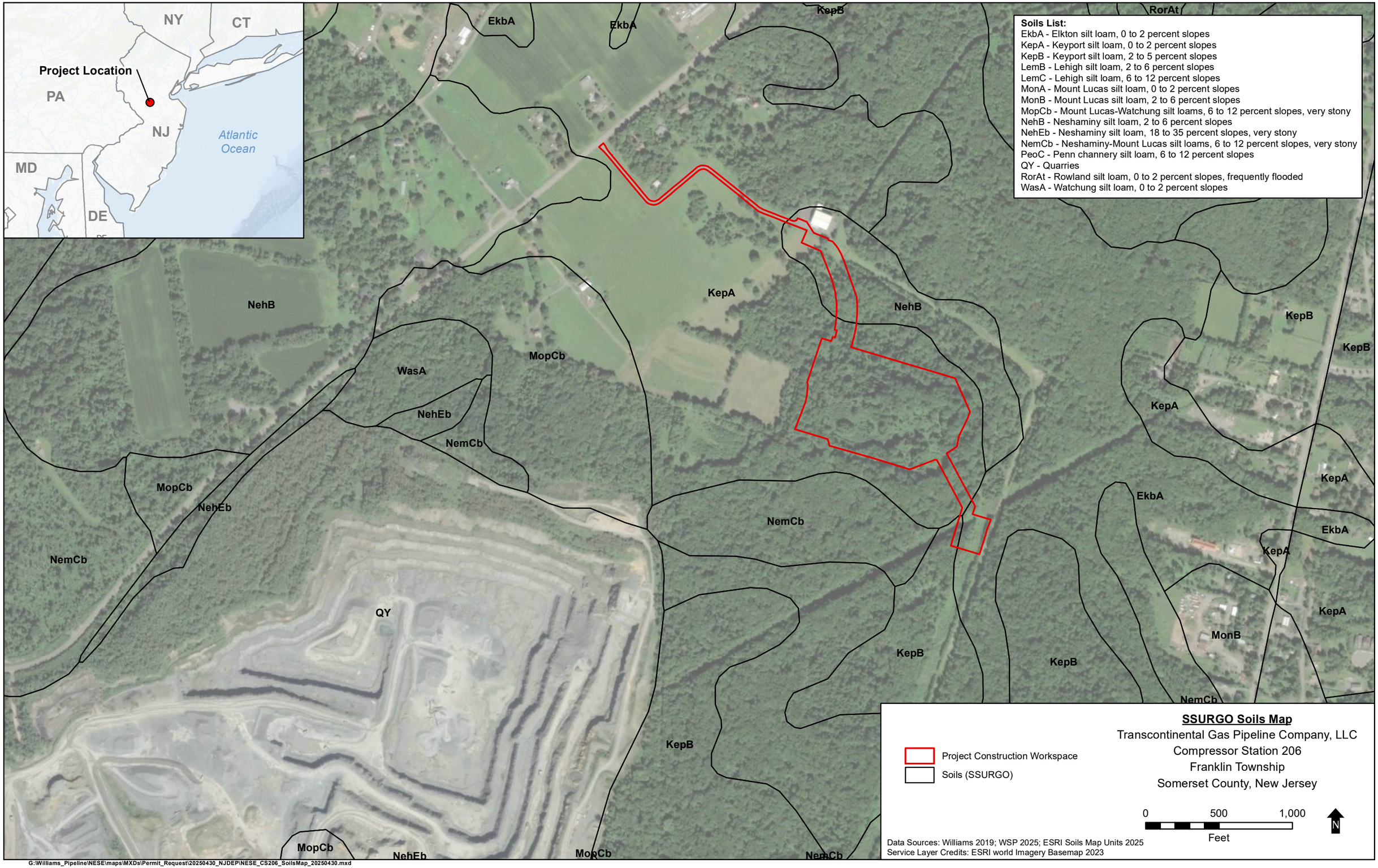
The Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov) indicate that soils within the Project area consist of 21 soil map units and water **(Figure 5).** A soil map unit is a grouping of soils by their natural landscape and soil patterns. Soil exhibiting similar characteristics and falling within certain defined limits are classified together as a soil series. Most map unit names specify the dominant soils series, which is part of a soil's taxonomy that includes order, great group, subgroup, family and series. Soil map unit names also typically include phases of soil series that convey additional information about a map unit, including attributes such as slope, surface texture, flooding and ponding, surface fragments, degree of erosion, and climate.

Two of the 21 soil mapping units identified within the Project area are classified as hydric by the NRCS, 1 is classified as predominately hydric, 11 are classified as predominantly nonhydric, and the remaining 7 are nonhydric. Hydric soils are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (59 FR 35680; 7/13/1994). Hydric soils are therefore typically found within wetlands. The soil map units within the project area are listed in **Table 7**.

3.0 HYDROLOGY

Compressor Station 206 is located within the Millstone River (below and including Carnegie Lake) (Hydrologic Unit Code (HUC) 11: 02030105110) watershed while the Madison and Raritan Bay Loops are located within the Raritan River Lower (below Lawrence) (HUC11: 02030105160) and Raritan/Sandy Hook Bay tributaries (HUC11: 02030104060) watershed. Sub-watersheds located within the Project Area are listed in **Table 8**. A sub-watershed is a smaller drainage basin of a local stream that eventually drains to a central point of the larger watershed. The NJDEP Division of Watershed Management has divided New Jersey into Watershed Management Area (WMA) and this Project crosses the following WMA: Millstone (WMA 10), Lower Raritan, South River, and Lawrence (WMA 9), and Monmouth (WMA 12).

7 NJDEP. 2023. NJ-GeoWeb: Geology Layers. Available online at: https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=02251e521d97454aabadfd8cf168e44d. Accessed May 3, 2025.



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Legend

Project Area



Sources:
Soil Survey Geographic (SSURGO) Database for Middlesex County, New Jersey,
U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, Texas, January 2014.
New Jersey 2015 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), Trenton, NJ, February 2016.

SOILS LIST:
DocB - Downer loamy sand, 0 to 5 percent slopes
DouC - Downer-Urban land complex, 5 to 10 percent slopes
EveB - Evesboro sand, 0 to 5 percent slopes
EveD - Evesboro sand, 10 to 15 percent slopes
HbmkB - Hammonton loamy sand, clayey substratum, 0 to 5 percent slopes
HumAt - Humaquepts, 0 to 3 percent slopes, frequently flooded
PdwAv - Pawcatuck-Transquaking complex, 0 to 2 percent slopes, very frequently flooded
PHG - Pits, sand and gravel
PHM - Pits, clay
PssA - Psamments, 0 to 3 percent slopes
PsuB - Psamments, waste substratum, 0 to 8 percent slopes
SacC - Sassafras sandy loam, 5 to 10 percent slopes
SadC - Sassafras gravelly sandy loam, 5 to 10 percent slopes
SafB - Sassafras loam, 2 to 5 percent slopes
UR - Urban land
WoekA - Woodstown sandy loam, clayey substratum, 0 to 2 percent slopes
WoekB - Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes

SSURGO Soils Map

Transcontinental Gas Pipeline Co. LLC
Northeast Supply Enhancement Project
Madison Loop / Onshore Raritan Loop
Old Bridge Township & Sayreville Borough
Middlesex County, New Jersey

ASGECI Project # 3980

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AMY S. GREENE ENVIRONMENTAL CONSULTANTS

TABLE 7. SOIL CHARACTERISTICS WITHIN THE PROJECT AREA

MAP UNIT SYMBOL	MAPPING UNIT NAME	DRAINAGE CHARACTERISTICS	HYDRIC RATING*
DocB	Downer loamy sand, 0 to 5 percent slopes	Well drained	5% Predominantly Nonhydric
DouC	Downer-Urban land complex, 5 to 10 percent slopes	Well drained	Nonhydric
EkbA	Elkton silt loam, 0-2% slopes	Poorly drained	90% Predominately Hydric
EveB	Evesboro sand, 0 to 5 percent slopes	Excessively drained	10% Predominantly Nonhydric
EveD	Evesboro sand, 10 to 15 percent slopes	Excessively drained	Nonhydric
KepA	Keyport silt loam, 0-2% slopes	Moderately well drained	5% Predominantly Nonhydric
KepB	Keyport silt loam, 2-5% slopes	Moderately well drained	5% Predominantly Nonhydric
HbmkB	Hammonton loamy sand, clayey substratum, 0 to 5 percent slopes	Moderately well drained	10% Predominantly Nonhydric
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	Poorly drained	Hydric
NehB	Neshaminy silt loam, 2-6% slopes	Well drained	Nonhydric
PdwAv	Pawcatuck-Transquaking complex, 0 to 2 percent slopes, very frequently flooded	Very poorly drained	Hydric
PHG	Pits, sand and gravel	Well drained	Nonhydric
PHM	Pits, clay	Somewhat poorly drained	Nonhydric
PssA	Psamments, 0 to 3 percent slopes	Well drained	15% Predominantly Nonhydric
PsuB	Psamments, waste substratum, 0 to 8 percent slopes	Well drained	15% Predominantly Nonhydric
SacC	Sassafras sandy loam, 5 to 10 percent slopes	Well drained	4% Predominantly Nonhydric
SadC	Sassafras gravelly sandy loam, 5 to 10 percent slopes	Well drained	Nonhydric
SafB	Sassafras loam, 2 to 5 percent slopes	Well drained	4% Predominantly Nonhydric
UR	Urban land	N/A	Nonhydric
WoekA	Woodstown sandy loam, clayey substratum, 0 to 2 percent slopes	Moderately well drained	5% Predominantly Nonhydric
WoekB	Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes	Moderately well drained	5% Predominantly Nonhydric

Sources: USDA-NRCS (2002, 2020a, 2020b)

***** Soil hydric ratings indicate the proportion of hydric components within each map unit, as follows:
Hydric: All components listed for a given map unit are rated as being hydric.
Predominantly Hydric: Components that comprise from 66 percent, up to 99 percent of the map unit are rated as hydric.
Predominantly Nonhydric: Components that comprise up to 33 percent of the map unit are rated as hydric.
Nonhydric: None of the components are rated as hydric.

TABLE 8. SUB-WATERSHEDS LOCATED WITHIN THE PROJECT AREA

Sub-Watershed Name	Hydrologic Unit Code (HUC 14)[8]	Watershed Name and HUC 11	Watershed Management Area
Heathcote Brook	02030105110010	Millstone River (below/including Carnegie Lake) 02030105110	Millstone (WMA 10)
Tennent Brook (below 74d 19m 05s)	02030105160060	Raritan R Lower (below Lawrence) 02030105160	Lower Raritan, South River, and Lawrence (WMA 9)
Cheesequake Creek / Whale Creek	02030104060010	Raritan / Sandy Hook Bay tributaries 02030104060	Monmouth (WMA 12)

Surface waters are classified by NJDEP based on designated uses. Freshwaters are classified as FW1 (not subject to any man-made wastewater discharges) and FW2 waters (all other freshwaters). Saline waters are classified as saline estuarine (SE) and saline coastal (SC). SE waters are further classified into SE1, SE2, and SE3 based on the designated uses. Category One (C1) waters are protected from any measurable change in water quality because of their exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources.

One stream is mapped within the Compressor Station 206 Project area (Caters Brook (FW2-NT)) and one mapped stream is crossed by the Madison Loop (Crossway Creek (FW2-NT/SE1). During the wetland delineations, unnamed tributaries to Tennent Brook, unnamed tributaries to Cheesequake Creek, and Crossway Creek were delineated. Cheesequake Creek, Crossway Creek, Tennent Brook, and their tributaries have been classified as FW2-NT/SE1 and FW2-NT. The unnamed tributaries to Tennent Brook drain to Tennent Brook and ultimately to South River. The unnamed tributaries to Cheesequake Creek, and Crossway Creek drain to Cheesequake Creek and ultimately to Raritan Bay. Raritan Bay is located east of the terminus of Madison Loop (MP 12.0) and is included in the Raritan Bay Loop portion of the project. Category One streams are not mapped within the vicinity of the Project.

According to the FEMA Effective Flood Hazard Area Maps (panels 34035C0261F, eff. 11/4/2016 and 34035C0263F, eff. 11/4/2016), portions of the Compressor Station 206 Project area are located within the 100-year floodplain (Zone A) associated with Caters Brook (**Figure 6**). Mapped FEMA floodplains are located in the northeast corner of the site and outside of the proposed limit of disturbance.

According to the FEMA Preliminary Flood Hazard Area Maps (panels 34023C0157G, issued 1/30/20215, 34023C0158G issued 1/30/2015, and 34023C0152G issued 1/30/2015) portions of the Madison and Raritan Bay Loops cross FEMA mapped floodplains (**Figure 6**). Mapped FEMA floodplains are associated with the Raritan Bay, Cheesequake Creek, Crossway Creek and Tennent Brook.

8 NJDEP. 2023. NJ-GeoWeb: Water Layers. Available online at: https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=02251e521d97454aabadfd8cf168e44d. Accessed February 1, 2023.



Project Construction Workspace
Stream (NJDEP)
100-year FEMA Floodplain

FEMA Floodplains Map
Transcontinental Gas Pipeline Company, LLC
Compressor Station 206
Franklin Township
Somerset County, New Jersey

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Data Sources: Williams 2019; WSP 2025; NJDEP 2020; FEMA 2023
Service Layer Credits: ESRI world Imagery Basemap 2023

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Legend

- Project Area
- 100-year FEMA Floodplain
- Floodway
- Zone V (Coastal High Hazard)
- Limit of Moderate Wave Action
- Cross Section Elevation
- Base Flood Elevation



Sources:
Preliminary Digital Flood Insurance Rate Map (DFIRM) Database, Middlesex County, New Jersey, Federal Emergency Management Agency, vector digital data, Federal Insurance and Mitigation Administration, Washington, DC, 1/30/2015.
New Jersey 2015 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), Trenton, NJ, February 2016.

FEMA Floodplain Map

Transcontinental Gas Pipeline Co. LLC
Northeast Supply Enhancement Project
Madison Loop / Onshore Raritan Loop
Old Bridge Township & Sayreville Borough
Middlesex County, New Jersey

ASGECI Project # 3980

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4.0 UPLAND VEGETATIVE COMMUNITIES

Based upon species composition, soils, and apparent hydrology noted during field investigation, five upland vegetative communities were identified within the project area: deciduous forests, early-successional shrubland, barren land, old fields, and urban lands (including mowed turf). Vegetation communities are based on the NJDEP's modified Anderson Classification System[9]. Vegetation observed or can be *assumed* to be within the project area is listed in **Table 9** along with the species' wetland indicator status. This is not a complete list of all vegetation present within the project area but provides an assessment of the dominant species observed. Photographs documenting the existing vegetative communities are included in **Appendix D**. Upland vegetative communities are briefly described below.

Deciduous forests: Areas of deciduous forest are present within the Compressor Station 206 project areas as well as along the border of the existing pipeline right-of-way. Deciduous forests are characterized by land dominated by trees generally greater than 5 m tall, and greater than 20 percent of total vegetative cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal changes. Within the project area, dominant deciduous forest species included northern red oak, white oak, red maple, black gum, sweet gum and black cherry .

Early successional shrubland: Areas of early-successional shrubland persist where right-of-way maintenance is less frequent. Early successional shrubland is characterized by land that has been cleared or disturbed with at least 50 percent coverage represented by shrubs. Within the project area, dominant shrub species included multiflora rose, greenbrier, *rubus* sp., red maple, sumac, and black cherry.

Old Field: Old field is characterized by uplands with less than 25% woody vegetation and dominated by successional grasses and herbs. Old fields are present along the pipeline ROW where vegetation maintenance activities are conducted to minimize woody vegetation. Representative vegetation includes upland grasses such as switch, broomsedge *Andropogon sp.*, deer tongue, hay scented fern, and orchard grass. Herbs include composites such as goldenrods, ragweed, and fleabane.

Urban Lands: Portions of the project area cross uplands that have been developed and as such are classified as urban lands. Urban lands consist of impervious surfaces including buildings, highways, parking lots, residential developments, and pervious surfaces including manicured lawn. Manicured lawn consists of residential, recreational, or commercial land dominated by ornamental grasses usually kept in a mowed state, and less than 30 percent cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50 percent cover. The groundcover is maintained by mowing.

Barren Lands: Barren lands are located along the project ROW where previous disturbance has resulted in a general lack of any significant vegetative cover.

[9] https://www.nj.gov/dep/gis/digidownload/metadata/lulc95/anderson.html and
https://www.nj.gov/dep/gis/digidownload/metadata/lulc95/codelist.html

TABLE 9. VEGETATION OBSERVED WITHIN THE PROJECT AREA

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS
Acer rubrum	Red maple	FAC
Acer saccharum	Sugar maple	FACW
Ageratina altissima	White snakeroot	FACU
Agrostis gigantea	Redtop	FACW
Agrostis stolonifera	Creeping bentgrass	FACW
Alisma subcordatum	American water plantain	OBL
Alliaria petiolata	Garlic mustard	FACU
Alnus serrulata	Smooth alder	FACW
Ambrosia artemisiifolia	Annual ragweed	FACU
Andropogon gerardii	Big bluestem	FAC
Andropogon glomeratus	Bushy bluestem	FACW
Andropogon virginicus	Broomsedge	FAC
Apocynum cannabinum	Indian hemp	FACU
Artemisia annua	Sweet sagewort	FACU
Artemisia vulgaris	Common wormwood	UPL
Arthraxon hispidus	Small carpetgrass	FAC
Baccharis halimifolia	Groundsel tree	FAC
Betula nigra	River birch	FACW
Betula populifolia	Gray birch	FACW
Bidens frondosa	Devil's beggartick	FACW
Carex lurida	Shallow sedge	OBL
Carex stricta	Tussock sedge	OBL
Celastrus orbiculatus	Oriental bittersweet	FACU
Cephalanthus occidentalis	Common buttonbush	OBL
Chamaecrista fasciculata	Partridge pea	FACU
Clethra alnifolia	Sweet pepperbush	FACW
Comptonia peregrina	Sweet fern	NI
Cornus racemosa	Gray dogwood	FAC
Cyperus strigosus	Strawcolored flatsedge	FACW
Dactylis glomerata	Orchardgrass	FACU
Danthonia sericea	Downy danthonia	FACU
Daucus carota	Queen Annes lace	UPL
Dennstaedtia punctilobula	Eastern hayscented fern	UPL
Dichanthelium clandestinum	Deer-tongue grass	FACW
Diodia teres	Poorjoe	FACU
Echinochloa crus-galli	Barnyard grass	FACW
Eleocharis acicularis	Needle spikerush	OBL
Eleocharis obtusa	Blunt spikerush	OBL
Eleocharis tenuis	Slender spikerush	FACW
Epilobium coloratum	Purple willowherb	OBL

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS
Equisetum arvense	Field horsetail	FAC
Erigeron annuus	Eastern daisy fleabane	FACU
Eupatorium hyssopifolium	Hyssopleaf thoroughwort	NI
Eupatorium perfoliatum	Common boneset	FACW
Eupatorium serotinum	Lateflowering thoroughwort	FAC
Euthamia graminifolia	Flat-top goldenrod	FAC
Fallopia japonica	Japanese knotweed	NI
Festuca rubra	Red fescue	FACU
Gleditsia triacanthos	Honeylocust	FAC
Impatiens capensis	Jewelweed	FACW
Juncus canadensis	Canada rush	OBL
Juncus effusus	Soft Rush	OBL
Juncus tenuis	Poverty rush	FAC
Juniperus virginiana	Eastern red cedar	FACU
Leersia oryzoides	Rice cut-grass	OBL
Lespedeza cuneata	Chinese lespedeza	FACU
Liquidambar styraciflua	Sweet gum	FAC
Lonicera japonica	Japanese honeysuckle	FACU
Lotus corniculatus	Bird's-foot trefoil	FACU
Lythrum salicaria	Purple loosestrife	OBL
Microstegium vimineum	Japanese stiltgrass	FAC
Morella pensylvanica	Northern bayberry	FAC
Nyssa sylvatica	Black gum	FAC
Onoclea sensibilis	Sensitive fern	FACW
Osmundastrum cinnamomeum	Cinnamon fern	FACW
Panicum virgatum	Switchgrass	FAC
Parthenocissus quinquefolia	Virginia creeper	FACU
Persicaria arifolia	Halberdleaf tearthumb	OBL
Persicaria maculosa	Spotted ladysthumb	FACW
Persicaria pensylvanica	Pennsylvania smartweed	FACW
Persicaria sagittata	Arrowleaf tearthumb	OBL
Phalaris arundinacea	Reed canarygrass	OBL
Phleum pratense	Timothy	FACU
Phragmites australis	Common reed	FACW
Pinus rigida	Pitch pine	FACU
Pinus strobus	White pine	FACU
Plantago lanceolata	Narrowleaf plantain	FACU
Plantago major	Common plantain	FAC
Populus deltoides	Eastern cottonwood	FAC
Prunus serotina	Black cherry	FACU
Pycnanthemum tenuifolium	Narrowleaf mountainmint	FACW

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS
Pycnanthemum verticillatum	Whorled mountainmint	FAC
Quercus alba	White oak	FACU
Quercus ilicifolia	Scrub oak	NI
Quercus macrocarpa	Bur oak	FACU
Quercus montana	Chestnut oak	UPL
Quercus palustris	Pin oak	FACW
Quercus rubra	Northern red oak	FACU
Quercus velutina	Black oak	NI
Rhododendron periclymenoides	Pink azalea	FAC
Rhus copallinum	Winged sumac	UPL
Rhus typhina	Staghorn sumac	NI
Robinia pseudoacacia	Black locust	UPL
Rosa multiflora	Multiflora rose	FACU
Rubus allegheniensis	Allegheny blackberry	UPL
Rubus flagellaris	Northern dewberry	UPL
Rubus hispidus	Bristly dewberry	FACW
Rubus idaeus	Red raspberry	FACU
Rubus pensilvanicus	Pennsylvania blackberry	FAC
Rubus pubescens	Dwarf red raspberry	FACW
Salix discolor	Pussy willow	FACW
Salix nigra	Black willow	OBL
Sassafras albidum	Sassafras	FACU
Schizachyrium scoparium	Little bluestem	FACU
Schoenoplectus americanus	Chairmaker's bulrush	OBL
Schoenoplectus pungens	Common threesquare	OBL
Scirpus atrovirens	Green bulrush	OBL
Scirpus cyperinus	Woolgrass	OBL
Setaria italica	Foxtail millet	FACU
Setaria pumila	Yellow foxtail	FAC
Smilax rotundifolia	Roundleaf greenbrier	FAC
Solidago altissima	Tall goldenrod	FACU
Solidago canadensis	Canada goldenrod	FACU
Solidago rigida	Stiff goldenrod	FACU
Solidago rugosa	Wrinkleleaf golldenrod	FAC
Solidago sempervirens	Seaside goldenrod	FACW
Spiraea alba	White meadowsweet	FACW
Stachys byzantina	Woolly hedgenettle	NI
Symphyotrichum prenanthoides	Crookedstem aster	FAC
Symplocarpus foetidus	Skunk cabbage	OBL
Toxicodendron radicans	Poison ivy	FAC
Typha latifolia	Broadleaf cattail	OBL

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS
Vaccinium corymbosum	Highbush blueberry	FACW
Viburnum recognitum	Southern arrowwood	FAC
Vitis labrusca	Fox grape	FAC

Key to indicator categories:
OBL: Obligate, almost always occur in wetlands.
FACW: Facultative Wetland, usually occur in wetlands, but may occur in non-wetlands.
FAC: Facultative, occur in wetlands and non-wetlands.
FACU Facultative Upland, usually occur in non-wetlands, but may occur in wetlands.
UPL: Upland, almost never occur in wetlands.
n/a: Not Applicable.
NI: Not found on national listings of plants occurring in wetlands.
Sources: USACE National Wetland Plant List (2022 [10]), Lichvar (2013)

5.0 WETLAND AND OPEN WATER AREAS

5.1 WETLANDS DELINEATION SURVEY

According to the NJDEP wetlands mapping, 11 classes of wetlands were identified within or adjacent to the Project area, including disturbed wetland (tidal and modified), herbaceous wetlands, deciduous wooded wetland, scrub/shrub wetland (deciduous and mixed – coniferous dominant), *Phragmites* dominant wetland (interior and coastal), saline marsh (low and high marsh), and wetland right-of-way (**Figure 7**). The wetland classes are based upon the Anderson et. Al. 1976 classification system[11] with some modifications specific to the New Jersey wetland mapping program[12].

Subsequent to a desktop review, wetland scientists conducted field investigations to determine jurisdictional boundaries of wetlands and open waters present within the project area, and if any waterbodies would be subject to regulations implemented by the NJDEP. Boundaries of wetlands and open waters were delineated in April and May 2025 and verified during NJDEP site inspections conducted in October 2025. Field surveys were previously conducted from June 2016 to August 2016, from November 2016 to January 2017, in April and May 2017 and 2019.

Wetlands and open waters were delineated using the Routine On-Site Inspection Methodology as set forth in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Interagency Committee for Wetland Delineation 1989) and the *USACE 1987 Wetlands Delineation Manual* (Environmental Laboratory 1987). For specific regional wetland indictors, wetland scientists consulted the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region[13] (Version 2.0) (USACE, 2010) and Eastern Mountains and Piedmont[14] (Version 2.0) (USACE, 2012). Wetlands, as defined in this manual, are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands were thus identified and delineated based on three parameters:

[10] https://wetland-plants.sec.usace.army.mil/static/reports/NWPL%20Cover%20Page%20National_v3.pdf
[11] Anderson, J.R., Hardy, E.E., Roach, J.T., & Witmer, R.E. 1976. *A land use and land cover classification system for use with remote sensor data.* U.S. Geological Survey Professional Paper, No. 964. USGS, Washington, D.C.
[12] https://www.nj.gov/dep/gis/digidownload/metadata/lulc12/anderson2012.html
[13] https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7594
[14] https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7607



Project Construction Workspace
Stream (NJDEP)

Wetland (NJDEP)
- Deciduous Scrub/Shrub Wetlands
- Deciduous Wooded Wetlands
- Disturbed/Agricultural Wetlands
- Former Agricultural
- Managed Wetland In Maintained Lawn
- Mixed Scrub/Shrub Wetlands
- Wetland Rights-Of-Way

Data Sources: Williams 2019; WSP 2025; NJDEP 2020
Service Layer Credits: ESRI world Imagery Basemap 2023

NJDEP Wetlands and Streams Map
Transcontinental Gas Pipeline Company, LLC
Compressor Station 206
Franklin Township
Somerset County, New Jersey

0 500 1,000
Feet

N

L:\Williams_Pipeline\NESE\maps\MXDs\Permit_Request\20250430_NJDEP\NESE_CS206_NJDEPWetlands_20250521.mxd

Legend

- Project Area
- Streams with Water Quality
- NJDEP Freshwater Wetlands
- NJDEP Tidal Wetlands



Sources:
NJDEP Wetlands of New Jersey by County, 1986, New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management, Bureau of Geographic Information and Analysis, NJDEP, Trenton, November 1999.
NJDEP Surface Water Quality Standards of New Jersey, NJ Department of Environmental Protection (NJDEP), Water Monitoring & Standards (WMS), Bureau of Freshwater and Biological Monitoring (BFBM), Trenton, NJ, December 2010.
New Jersey 2015 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles, State of New Jersey - Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), Trenton, NJ, February 2016.

Wetland List:
E2EM2M - Estuarine, Intertidal, Emergent, Non-persistent, Irregularly Exposed
E2SS6N - Estusrine, Intertidal, Scrub-shrub, Deciduous, Regularly Flooded
MODD - Disturbed Areas (Surface / Vegetation disturbed, nature of activity not readily apparent)
MODL - Lawns / Stormwater Management Areas (Areas not normally inundated)
PEM1B - Palustrine, Emergent, Persistent, Saturated
PSS1B - Palustrine, Scrub-shrub, Broad-leaved Deciduous, Saturated
PEM1C - Palustrine, Emergent, Persistent, Seasonally Flooded
PSS1C - Palustrine, Scrub-shrub, Broad-leaved Deciduous, Seasonally Flooded
PEM1F - Palustrine, Emergent, Persistent, Semiperminently Flooded
PFO1 / 4C - Palustrine, Forested, Broad-leaved Deciduous, Needle-Leaved Evergreen, Seasonally Flooded
PFO1A - Palustrine, Forested, Broad-leaved Deciduous, Temporarily Flooded
PFO1B - Palustrine, Forested, Broad-leaved Deciduous, Saturated
PFO1C - Palustrine, Forested, Broad-leaved Deciduous, Seasonally Flooded
PFO1D - Palustrine, Forested, Broad-leaved Deciduous, Partly Drained / Ditch
PSS1D - Palustrine, Scrub-shrub, Broad-leaved Deciduous, Partly Drained / Ditched
PFO4B - Palustrine, Forested, Needle-leaved Deciduous, Saturated
PFO4C - Palustrine, Forested, Needle-leaved Evergreen, Seasonally Flooded
PSS1 / 4B - Palustrine, Scrub-shrub, Broad-leaved Deciduous, Needle-leaved Evergreen, Saturated
PSS1B - Palustrine, Scrub-shrub, Broad-leaved Deciduous, Saturated
PEM1B - Palustrine, Emergent, Persistent, Saturated
PSS1C - Palurtrine, Scrub-shrub, Broad-leaved Deciduous, Seasonally Flooded
PSS4 / 1C - Palustrine, Scrub-shrub, Needle-leaved Evergreen, Broad-leaved Deciduous, Seasonally Flooded

PFO1A
PFO1C
PFO1C
PEM1C/PSS1C
PEM1B
PFO1A
PEM1C/PSS1C
PFO1B
PSS1C
PFO1B
PSS1B
Crossway Creek FW2-NT/SE1
Cheesequake Creek UNT FW2-NT/SE1
Flat Creek UNT FW2-NT/SE1
PEM1B
MODD
MODD
MODD
Flat Creek UNT FW2-NT/SE1
PEM1B
Flat Creek FW2-NT/SE1
PSS1B
PSS1B
MODD
PSS4/1C
Melvins Creek FW2-NT/SE1
Cheesequake Creek FW2-NT/SE1
Flat Creek UNT FW2-NT/SE1
Flat Creek UNT FW2-NT/SE1
Flat Creek UNT FW2-NT/SE1
PFO1B
E2SS6N
Stump Creek UNT FW2-NT/SE1
PFO1A
PSS1B
PSS1C
MODD
PFO1D/PSS1D
PFO1A
PFO1C
PFO1B
PSS1B
PSS1B
PEM1F
MODD
PFO1C
PFO4C
PFO1C
MODD
E2EM2M
PSS1C
E2EM2M
PFO4/1B
PSS1B/PEM1B
PFO4/1B
PFO1B
MODD
PFO1/4C
PFO4B
PSS1B
MODD
PFO1C
PFO4B
PSS1B
PFO1B
Cheesequake Creek UNT FW2-NT/SE1

NJDEP Wetlands and Streams Map

Transcontinental Gas Pipeline Co. LLC
Northeast Supply Enhancement Project
Madison Loop / Onshore Raritan Loop
Old Bridge Township & Sayreville Borough
Middlesex County, New Jersey

ASGECI Project # 3980

N W E S

1,000
Feet

AMY S. GREENE ENVIRONMENTAL CONSULTANTS, Inc.

1. Hydrophytic vegetation – the dominant vegetation consists of species capable of growing in water or on substrate that is at least periodically deficient in oxygen as a result of the presence of water;
2. Hydric soils – soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth of hydrophytic vegetation; and
3. Wetland hydrology – the area is inundated permanently or periodically, or the soil is saturated to the surface for sufficient duration during the growing season to support hydrophytic vegetation.

Based on the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), four classes of wetlands were identified in the Project area (**Table 10**). Areas of palustrine forested wetland (PFO), palustrine scrub-shrub wetland (PSS), palustrine emergent wetland (PEM), and estuarine intertidal emergent wetland (E2EM) were identified. Within the Project area, in ecotones where one wetland type grades to another and or in areas undergoing stages of succession, mixes of the classes occur (e.g., PFO/PEM, PEM/PSS, E2EM/PFO).

TABLE 10. SUMMARY OF DELINEATED FEATURES WITHIN THE PROJECT

Facility	Type and Number of Wetlands									
	PEM	PSS	PFO	E2EM	PEM/ PSS	PEM/ PFO	PEM/ E2EM	PFO/ E2EM	PEM/ PSS/ PFO	Total
Compressor Station 206	2	0	0	0	0	3	0	0	2	7
Madison Loop	11	0	3	2	2	3	1	1	1	24
Raritan Bay Loop	0	0	0	0	0	0	0	0	0	0
Total	**14**	**0**	**3**	**2**	**2**	**6**	**1**	**1**	**3**	**31**

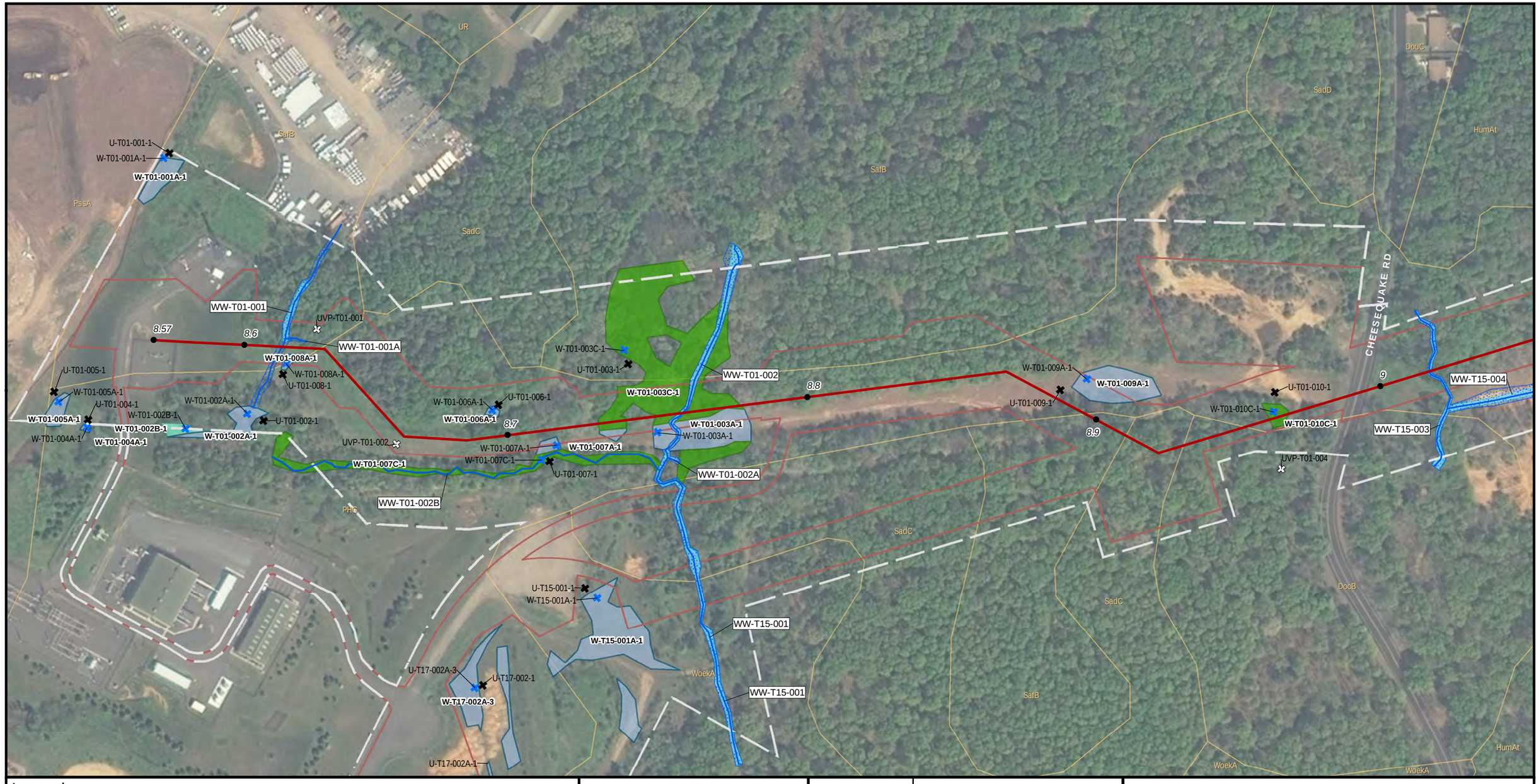
The wetland delineation for the proposed Project identified 31 features, totaling approximately 45.44 acres, of which 19.89 acres are within the proposed Madison Loop survey area and 25.55 acres are within the Compressor Station 206 Project area (**Figure 8**). Additional information pertaining to the wetland delineation report is provided in **Appendix E**. Detailed information for each delineated wetland is provided as in the Wetland Table (Attachment 8 of the wetland delineation report). The locations and boundaries of delineated wetlands and streams are shown on the Freshwater Wetland Plans and Waterfront Development Plans. Color photographs were taken of each delineated wetland during the field survey and are presented in **Appendix D**. Completed wetland determination data forms documenting the soil, vegetative and hydrologic conditions are provided as a part of the wetland delineation report in **Appendix E**.

5.2 Wetlands within the Compressor Station 206 Limit of Disturbance

The proposed limit of disturbance of Compressor Station 206 contains one wetland (W-T09-001) that is classified as a palustrine emergent and palustrine forested wetland (PEM/PFO) (**Table 11**). Wetland W-T09-001 is within the Compressor Station tie-in workspace. Wetland W-T09-001 is considered "intermediate/exceptional" resource value wetland because it includes areas with habitat documented to contain a threatened species as well as portions considered to be of intermediate value that do not contain suitable threatened species habitat.

Herbaceous species common in PEM wetlands include redtop, sedges, Pennsylvania smartweed, arrowleaf tearthumb, canary reed grass, and common reed. Within PFO wetlands, the representative species include red maple, sweetgum, and blackgum in the canopy and sapling layers.

The proposed Higgins Access Road will cross wetland W-T23-002C-2. W-T23-002C-2 is a depressional PEM wetland located to the south of the EPA access road in the Higgins' farm pasture. This wetland is of intermediate resource value.



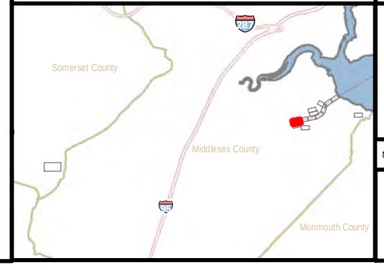
Legend

- Milepost
- Madison Loop
- LOD
- Upland Verification Point
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Surveyed Areas
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Top of Bank
- Ordinary High Water Mark
- Soil Type

0 50 100 150 200
Feet

N

SITE LOCATION



DRAWING NO.

REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	8/6/2019	MK	ISSUED FOR NJ WETLAND DELINEATION REPORT	1000891	CE	

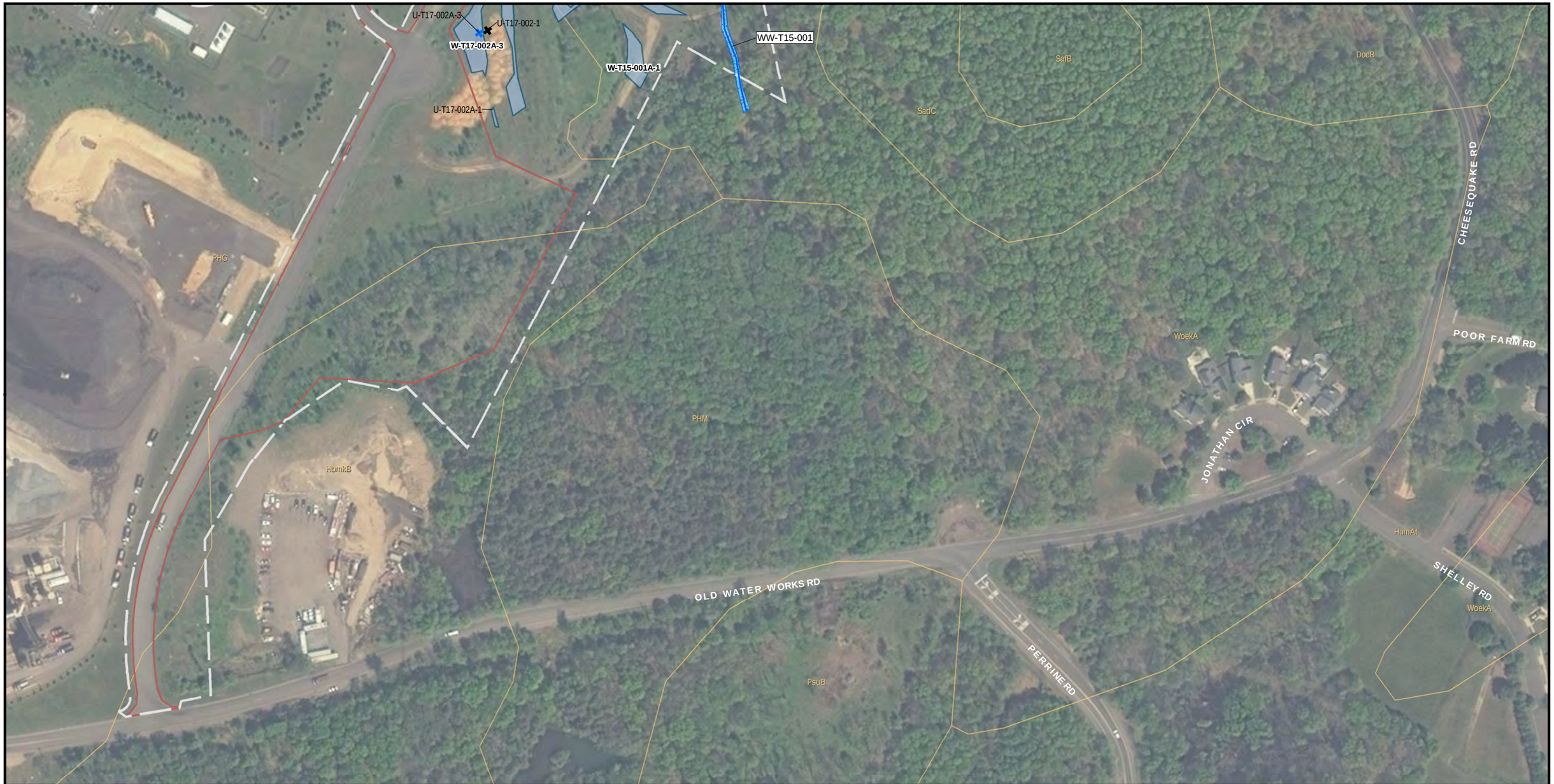
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FIELD DELINEATED WOTUS FEATURES AND SOIL MAP
RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

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APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
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Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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Legend

- LOD
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Surveyed Areas
- PEM Wetland
- Top of Bank
- Ordinary High Water Mark
- Soil Type

0 50 100 150 200

Feet

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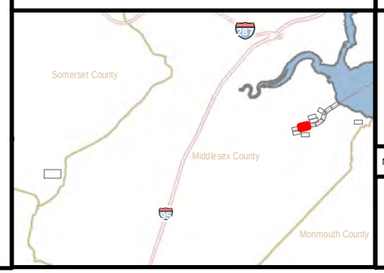
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0 50 100 150 200

Feet

N

SITE LOCATION



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APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
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Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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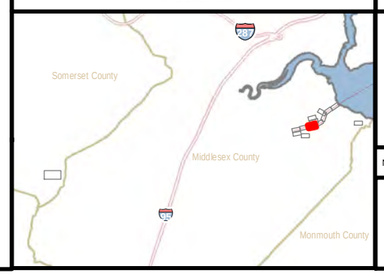
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- Milepost
- Madison Loop
- LOD
- Upland Verification Point
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Surveyed Areas
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Top of Bank
- Ordinary High Water Mark
- Soil Type

0 50 100 150 200
Feet

N

SITE LOCATION



DRAWING NO.

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RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
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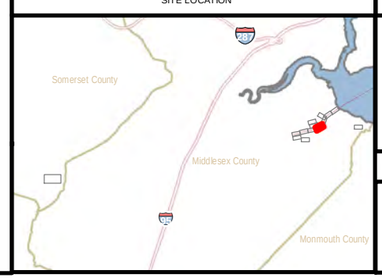
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- Upland Verification Point
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- Wetland Data Point
- Waterway Line
- Upper Wetland Boundary
- Surveyed Areas
- E2EM Wetland
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0 50 100 150 200

Feet

N

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Williams

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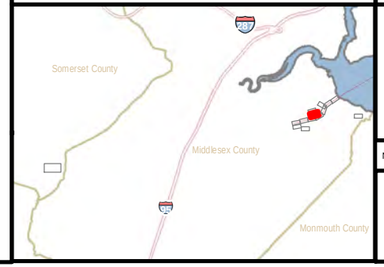
- LOD
- Upland Verification Point
- Surveyed Areas
- Soil Type

0 50 100 150 200

Feet

N

SITE LOCATION



DRAWING NO.	REFERENCE TITLE

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RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
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Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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Legend

LOD

Surveyed Areas

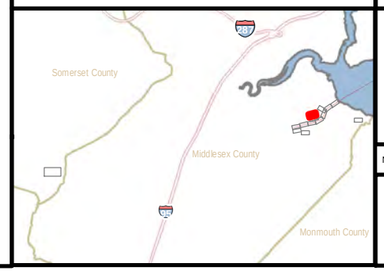
Soil Type

0 50 100 150 200

Feet

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SITE LOCATION



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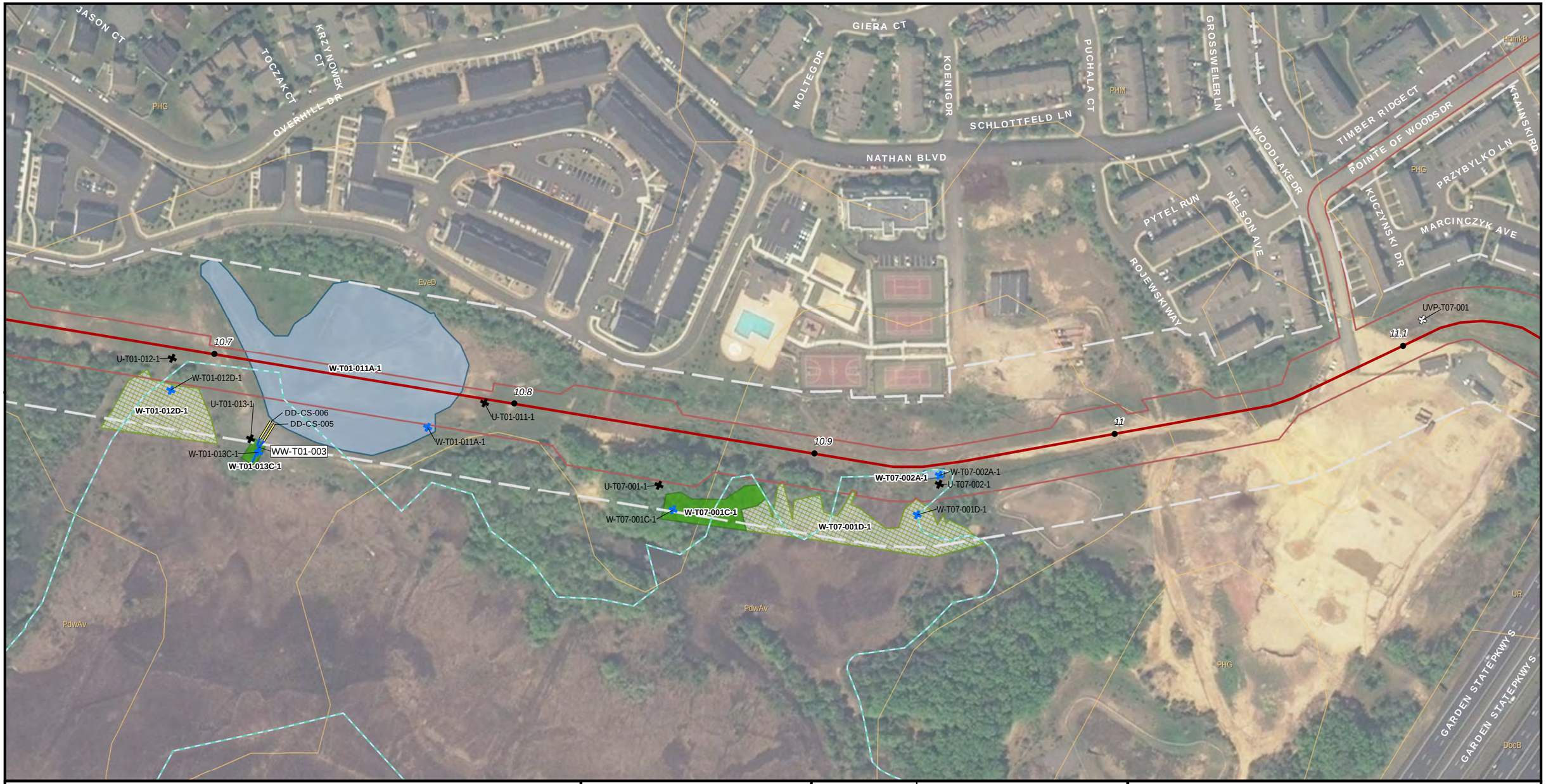
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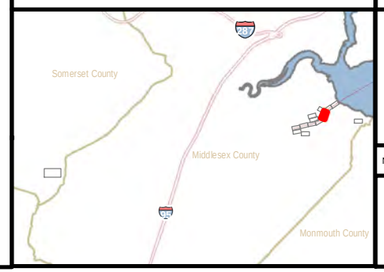


Legend

- Milepost
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- Upland Verification Point
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Jurisdictional Drain Lines
- Culvert
- Upper Wetland Boundary
- Surveyed Areas
- E2EM Wetland
- PEM Wetland
- PFO Wetland
- Top of Bank
- Ordinary High Water Mark
- Soil Type

0 50 100 150 200
Feet

SITE LOCATION



DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	8/6/2019	MK	ISSUED FOR NJ WETLAND DELINEATION REPORT	1000891	CE	

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FIELD DELINEATED WOTUS FEATURES AND SOIL MAP
RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

DRAWN BY: MK	DATE: 8/6/2019	ISSUE FOR BID: N/A	SCALE:
CHECKED BY: CE	DATE: 8/6/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20a
APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
WO: 1000891	FIELD DATA: 8/6/2019	3:10 PM 8/6/2019	SHEET 8 of 14

Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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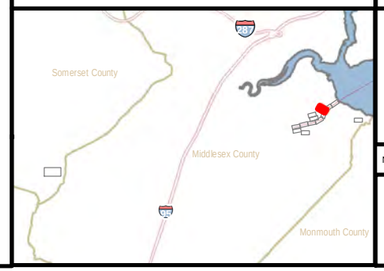
Legend

- Milepost
- Madison Loop
- LOD
- Upland Verification Point
- Surveyed Areas
- Soil Type

0 50 100 150 200

Feet

SITE LOCATION



DRAWING NO.	REFERENCE TITLE

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A	8/6/2019	MK	ISSUED FOR NJ WETLAND DELINEATION REPORT	1000891	CE	

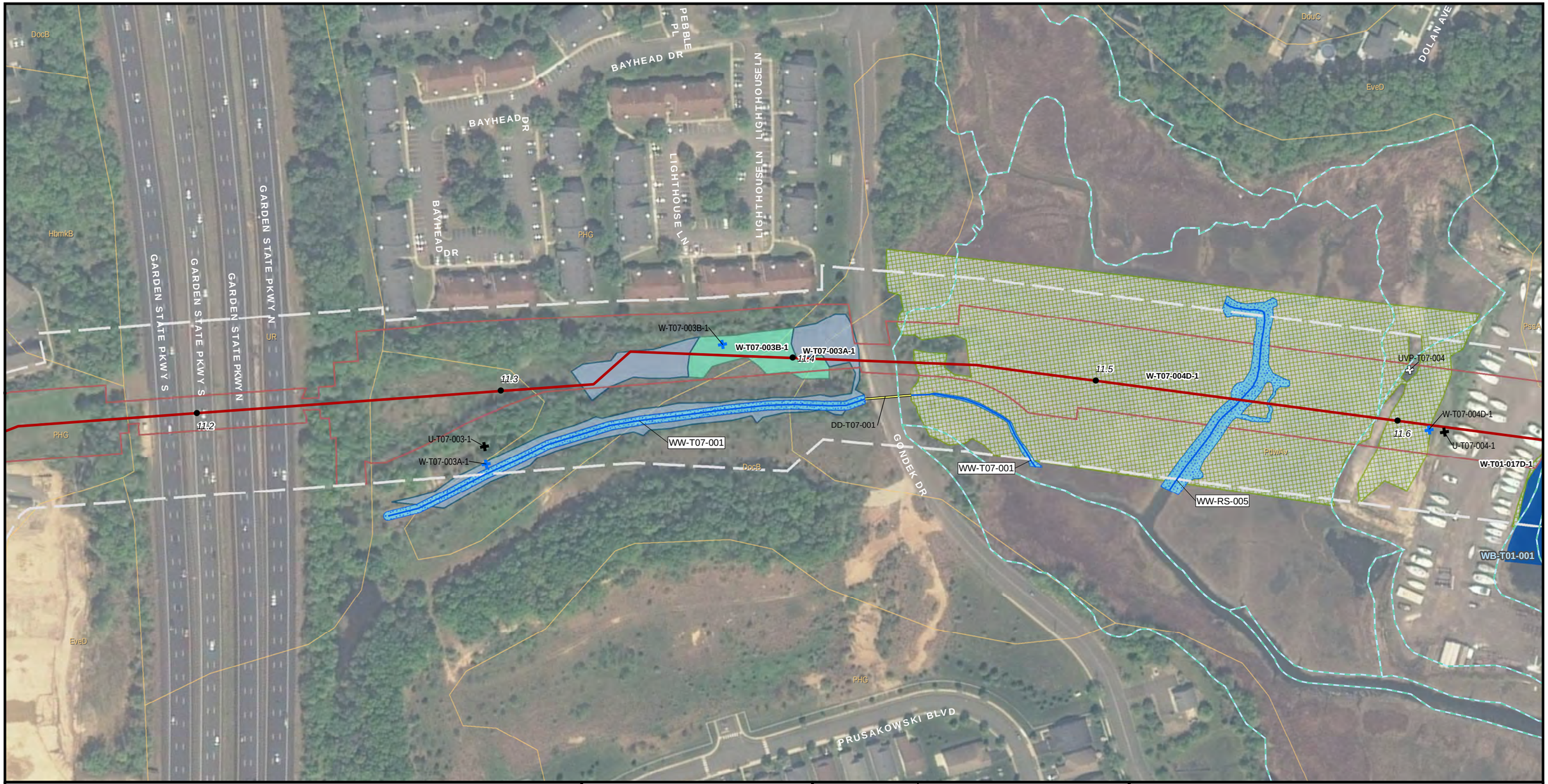
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RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

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APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 8	SHEET 9 of 14
WO: 1000891	FIELD DATA: 8/6/2019	3:11 PM 8/6/2019	

Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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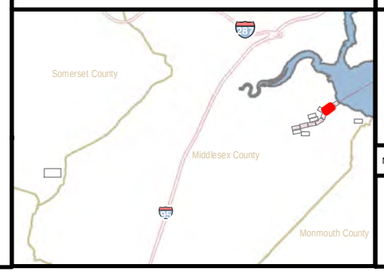
Legend

- Milepost
- Madison Loop
- LOD
- Upland Verification Point
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Jurisdictional Drain Lines
- Culvert
- Upper Wetland Boundary
- Surveyed Areas
- E2EM Wetland
- PEM Wetland
- PSS Wetland
- Top of Bank
- Waterbody
- Ordinary High Water Mark
- Soil Type

0 50 100 150 200

Feet

SITE LOCATION



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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

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CHECKED BY: CE	DATE: 8/6/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20a
APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
WO: 1000891	FIELD DATA: 8/6/2019 3:11 PM 8/6/2019		SHEET 10 of 14

Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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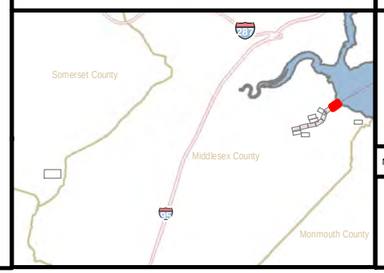
Legend

- Milepost
- Madison Loop
- LOD
- Upland Data Point
- Wetland Data Point
- Upper Wetland Boundary
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- E2EM Wetland
- PEM Wetland
- Waterbody
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0 50 100 150 200

Feet

SITE LOCATION



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Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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Legend

LOD

Surveyed Areas

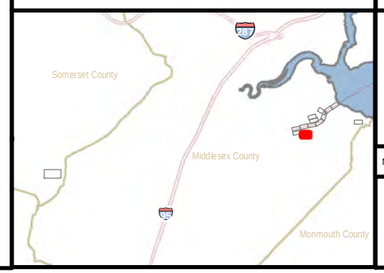
Soil Type

0 75 150 225 300

Feet

N

SITE LOCATION



DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	8/6/2019	MK	ISSUED FOR NJ WETLAND DELINEATION REPORT	1000891	CE	

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NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

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APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
WO: 1000891	FIELD DATA: 8/6/2019	3:12 PM 8/6/2019	SHEET 12 of 14

Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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Legend

LOD

Surveyed Areas

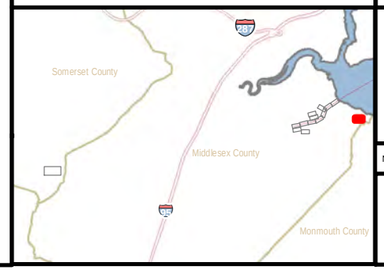
Soil Type

0 50 100 150 200

Feet

N

SITE LOCATION



DRAWING NO.

REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FIELD DELINEATED WOTUS FEATURES AND SOIL MAP
RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

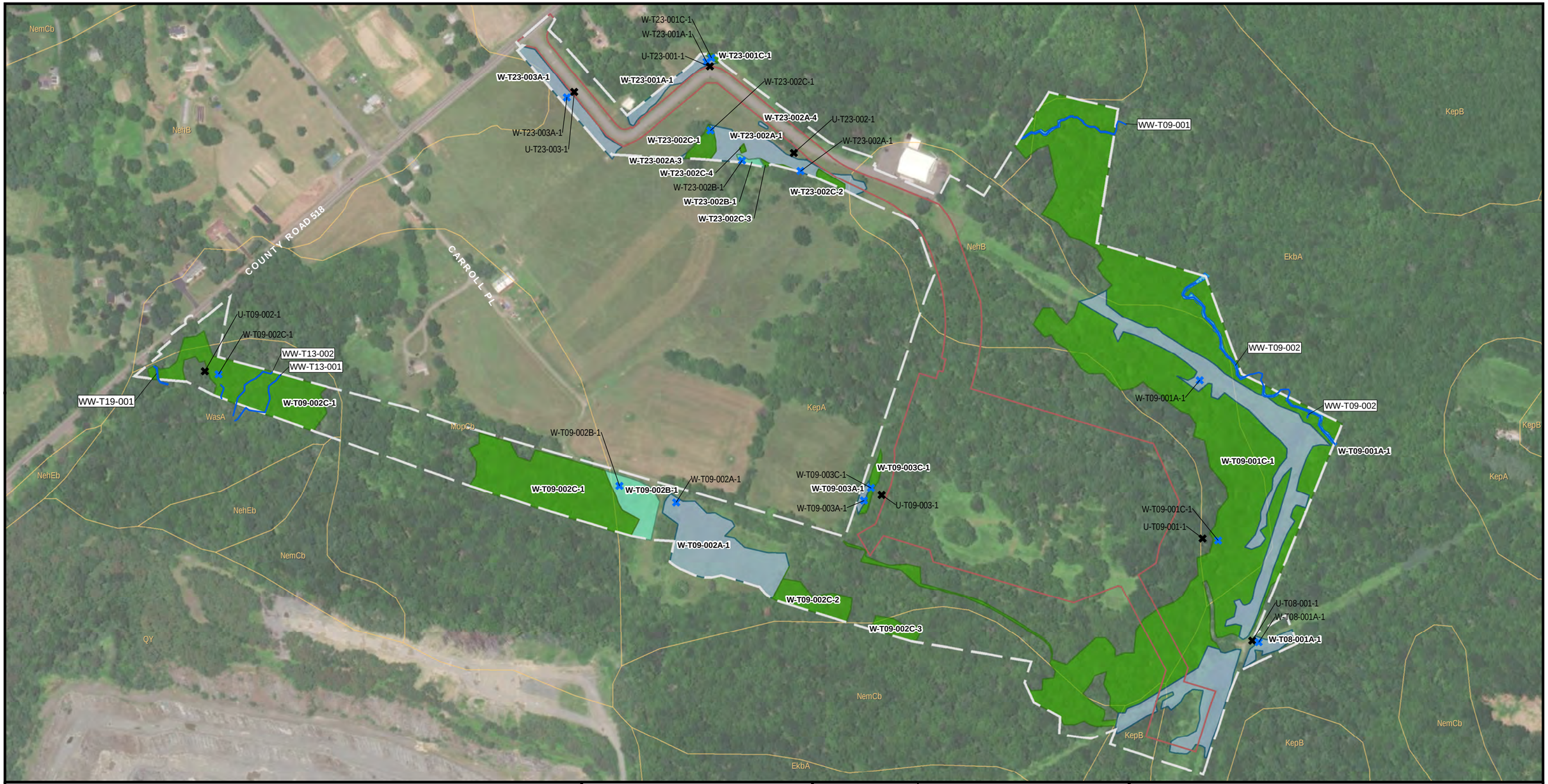
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APPROVED BY:	DATE:		
WO: 1000891	FIELD DATA: 8/6/2019	DRAWING NUMBER: FIGURE 8	SHEET 13 of 14

3:13 PM 8/6/2019

Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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Legend

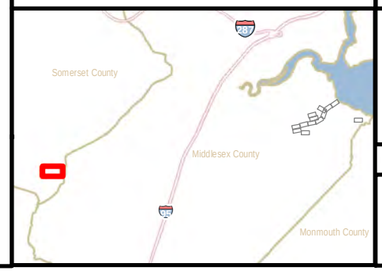
- LOD
- Upland Data Point
- Wetland Data Point
- Waterway Line
- Surveyed Areas
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Top of Bank
- Ordinary High Water Mark
- Soil Type

0 200 400 600

Feet

N

SITE LOCATION



DRAWING NO.

REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FIELD DELINEATED WOTUS FEATURES AND SOIL MAP
RARITAN BAY LOOP, MADISON LOOP AND COMPRESSOR STATION 206
NORTHEAST SUPPLY ENHANCEMENT PROJECT (NESE)
NEW JERSEY

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	8/7/2019	MK	ISSUED FOR NJ WETLAND DELINEATION REPORT	1000891	CE	

DRAWN BY: MK	DATE: 8/7/2019	ISSUE FOR BID: N/A	SCALE:
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APPROVED BY:	DATE:	DRAWING NUMBER:	FIGURE 8
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Data Sources: Williams 2017; E&E 2017; ESRI 2012; SSURGO 2016; U.S. Fish and Wildlife Service, 2012.

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TABLE 11. WETLANDS CROSSED BY THE PROJECT FACILITIES

WETLAND ID	MILEPOST	WETLAND TYPE	NJDEP RESOURCE CLASSIFICATION
Compressor Station 206			
W-T09-001	N/A	PEM/PFO	Intermediate/Exceptional
Madison Loop			
W-T01-008	8.61	PEM	Intermediate
W-T01-007	8.71	PEM	Intermediate
W-T15-001	8.73	PEM	Intermediate
W-T01-003	8.76	PEM/PFO	Intermediate
W-T01-009	8.90	PEM	Intermediate
W-T15-003[b]		PEM/PFO	Intermediate
W-T15-002	9.32	PEM	Ordinary
W-T15-004	10.05	PFO	Intermediate
W-T01-014	10.08	PEM/PSS/PFO	Intermediate
W-T01-015	10.17	PEM	Ordinary
W-T01-012	10.68	E2EM	Intermediate
W-T01-011	10.75	PEM	Intermediate
W-T07-002	10.94	PEM	Ordinary
W-T07-003	11.35	PEM/PSS	Intermediate
W-T07-004[a]	11.45	E2EM	Exceptional
W-T01-017[b, c]	11.77	PEM/E2EM	Intermediate/Exceptional
Madison Loop HDD (foot traffic only, no regulated disturbances)			
W-T01-010	8.96	PFO	Intermediate
W-T15-003[b]	9.21	PEM/PFO	Intermediate
W-T07-004[a]	11.46	E2EM	Exceptional
W-T01-017[b, c]	11.77	PEM/E2EM	Intermediate/Exceptional
Raritan Bay Loop			
N/A	N/A	N/A	N/A

[a] Wetland crossed by both open-cut and HDD.
[b] Wetland crossed by both additional temporary workspace and HDD.

Key:
HDD = Horizontal directional drill
E2EM= Estuarine intertidal emergent
N/A=Not applicable
PFO= Palustrine forested
PSS= Palustrine scrub-shrub
PEM = Palustrine emergent
FWPA=Freshwater Wetlands Protection Act

New Jersey Natural Heritage Program (NHP) database letters for the Compressor Station 206 site, dated June 5, 2025 and June 23, 2017 (letter attached under **Appendix A**) identified vernal pool habitat adjacent to the Compressor Station 206 site and 1,000-ft dispersal areas from these vernal pools that extend into the limits of disturbance for Compressor Station 206. Wetlands that are contained within the dispersal areas from the potential vernal pools may be subject to special protection by the NJDEP. A review of the NJDEP Vernal Pools and Vernal Habitats Landscape Project, version 3.4, identifies two vernal pools immediately west of Compressor Station 206 site. During the 2025, wetland verification field surveys, obligate and facultative vernal pool breeding species including spotted turtle and woof frog egg masses were observed within standing water associated with Wetland W-T09-003A-1.

5.3 WETLANDS WITHIN THE MADISON LOOP LIMIT OF DISTURBANCE

The Madison Loop facilities will cross 17 wetlands (**Table 11**). Of these wetlands, eight are classified as palustrine emergent (PEM); one is classified as palustrine scrub-shrub (PSS)/PEM; and two are classified as E2EM wetlands due to their estuarine and intertidal location. Palustrine forested (PFO) wetlands account for two of the wetlands crossed by the Madison Loop. Additionally, two wetlands were classified as PFO/PEM; one was classified as a PFO/PSS/PEM wetland; and one was classified as an estuarine intertidal emergent (E2EM)/PEM wetland.

Herbaceous species common in Madison Loop PEM wetlands include redtop, sedges, Pennsylvania smartweed,, arrowleaf tearthumb, canary reed grass, and common reed. Within Madison Loop PSS wetlands, the representative species include spotted jewelweed, Japanese stilt-weed, spicebush, and arrowwood. Within Madison Loop PFO wetlands, the representative species include red maple, sweetgum, and blackgum. Within Madison Loop E2EM wetlands, the representative species include switchgrass and common reed.

The Freshwater Wetlands Protection Act (FWPA) classifications of freshwater wetlands crossed by the pipeline in New Jersey are identified in **Table 11**. In total, two wetlands to be crossed are considered either "exceptional" resource value (W-T07-004) or a combination of "intermediate/exceptional" resource value (W-T01-017) because they are located within, or partially within, habitat documented to contain threatened or endangered species; of these, W-T01-017 is entirely located within an area where HDD construction will occur and the other (W-T07-004) is partially located within the HDD construction area; the area of these two wetlands located in the HDD area will not be impacted by the Project. Four wetlands have been identified as "ordinary" resource value, and 12 have been identified as "intermediate" resource value wetlands (W-01-010 is entirely within the HDD area).

5.4 WATERBODIES WITHIN THE PROJECT

Fifteen watercourses and one waterbody were delineated within the Madison Loop project area and five watercourses were delineated within the Compressor Station 206 project area. Data forms are included in Attachment 9 of the wetland delineation report (**Appendix E**). A summary of the delineated watercourse is provided in **Table 12.**

TABLE 12. SUMMARY OF DELINEATED WATERCOURSES AND WATERBODIES WITHIN PROJECT

FACILITY	TYPE AND NUMBER OF WATERCOURSE				
	PERENNIAL	INTERMITTENT	EPHEMERAL	WATERBODIES	TOTAL
Compressor Station 206	2	1	2	0	5
Madison Loop	3	7	5	1	16
Raritan Bay Loop (onshore)	0	0	0	0	0
Total	**5**	**8**	**7**	**1**	**21**

6.0 THREATENED AND ENDANGERED SPECIES

Information regarding the historic or current presence of Federal and/or State-listed endangered, threatened, special concern, proposed, or candidate species, or habitat to support those species located in the vicinity of the project area was obtained from the NJDEP Landscape Project (Version 3.4), NJDEP Natural Heritage Program (NHP) and the U.S. Fish and Wildlife Service (USFWS) Information of Planning and Consultation (IPaC).

6.1 NJDEP LANDSCAPE PROJECT DATA

The NJDEP uses the Landscape Project mapping to identify potential listed wildlife habitat in accordance with land use regulations, including the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A) and the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13). The NJDEP Landscape Project is a landscape-level approach to the conservation of imperiled wildlife species in New Jersey. The Landscape Project geographic information system depicts critical wildlife habitat through the integration of species location data, land-use/land-cover, and species life history information. According to the Landscape Project (Version 3.4) habitat mapping for rare wildlife species or wildlife habitat is known to occur in the immediate vicinity of the project area (**Figure 9**) (**Table 13**).

Through its Natural Heritage Database, the NJDEP-Office of Natural Lands Management (ONLM) documents rare plant species and rare ecological community habitat to inform decision-makers who need to address the conservation of natural resources. The Natural Heritage Grid Map is a GIS file that provides a general portrayal of the geographic locations of rare plant species and rare ecological communities for the entire state without providing sensitive detailed information. The Natural Heritage Grid Map divides each USGS Quadrangle map into 100 cells, with each cell ranging from 358 to 372 acres in size. If a rare plant or ecological community is documented anywhere within a cell, then the entire cell will be coded for the occurrence. Each grid cell is coded into one (1) of four (4) categories:

1. S – the location of listed plant species is precisely known within the cell;
2. M – the location is not precisely known but the documented location is only known to within 1.5 miles;
3. BOTH – both precisely known and less precise occurrences are found within the same cell; and
4. NONE – the cell does not contain any aforementioned documented records.

According to the NJDEP-ONLM, the Madison Loop is within grid maps containing one (1) State endangered vascular plant species.

6.2 NJDEP NATURAL HERITAGE PROGRAM

6.2.1 MADISON AND RARITAN BAY LOOPS (ONSHORE)

According to the NJ NHP response letter, dated June 3, 3025, for the Madison and Raritan Bay (onshore) Loops, potential habitat for the following threated and endangered species is mapped within or immediately adjacent to the Project: Atlantic sturgeon (migration corridor – adult sighting), shortnose sturgeon (migration corridor – adult sighting), black-crowned nigh-heron (foraging), yellow-crowned night-heron (foraging – immediate vicinity), northern harrier (breeding sighting), saltmarsh sparrow (breeding sighting), leatherback sea turtle (occupied habitat), and loggerhead sea turtle (occupied habitat) (letters included in **Appendix A**). Previous NJ NHP database letters for the Madison Loop, dated July 8, 2019 and May 19, 2017 indicate the presence of suitable habitat for the bald eagle (foraging and nesting habitat), the black-crowned night-heron (foraging habitat), and the osprey (foraging and nesting habitat) within areas located to the east of Route 9 and generally in association with Cheesequake Creek and its adjacent wetlands. In January 2025, the bald eagle and osprey were removed from the state's list of endangered species. The bald eagle is reclassified as a species of concern; while the osprey is stable.



Project Construction Workspace

Piedmont Habitat (Landscape Project v3.4)

- Rank 1 - Habitat Specific Requirement
- Rank 2 - Special Concern
- Rank 3 - State Threatened

Data Sources: Williams 2019; WSP 2025; ESRI 2025; NJDEP Landscape Project v3.4 2024
Service Layer Credits: ESRI World Topo Basemap 2025

NJDEP Landscape Project v3.4

Transcontinental Gas Pipeline Company, LLC
Compressor Station 206
Franklin Township
Somerset County, New Jersey

0 200 400 600 800
Feet

N

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Project Construction Workspace

Piedmont Habitat (Landscape Project v3.4)

- Rank 1 - Habitat Specific Requirement
- Rank 2 - Special Concern
- Rank 3 - State Threatened
- Rank 4 - State Endangered
- Rank 5 - Federal Listed

Data Sources: Williams 2019; WSP 2025; ESRI 2025;
NJDEP Landscape Project v3.4 2024
Service Layer Credits: ESRI World Topo Basemap 2025

NJDEP Landscape Project v3.4

Transcontinental Gas Pipeline Company, LLC
Madison Loop / Onshore Raritan Loop
Old Bridge Township and Sayreville Borough
Middlesex County, New Jersey

0 1,000 2,000
Feet

N

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TABLE 13. NJDEP LANDSCAPE DATA IDENTIFIED SUITABLE HABITAT FOR LISTED SPECIES WITHIN THE PROJECT

SPECIES	TYPE	HABITAT	MILE POST / LOCATION	STATE STATUS	YEAR OBSERVED
Compressor Station 206					
Barred Owl	Non-breeding Sighting	Deciduous Wooded Wetlands, Deciduous Forest, Wetland Rights-of-way	N/A	Threatened	2018
Madison Loop					
Saltmarsh Sparrow	Breeding Sighting	Phragmites Dominate Coastal Wetlands, Saline Marsh (Low Marsh), Disturbed Wetlands, Deciduous Brush/shrubland	11.5-12	Threatened	1993
Black-crowned Night-heron	Foraging	Saline Marsh (Low Marsh), Tidal Rivers, Inland Bays, And Other Tidal Waters	11.5-11.9	Threatened	2002
Raritan Bay Loop (Onshore)					
Saltmarsh Sparrow	Breeding Sighting	Urban Areas, Deciduous Brush/shrubland, Saline Marsh (High Marsh)	12	Threatened	1993
Northern Harrier	Breeding Sighting	Deciduous Brush/shrubland, Saline Marsh (High Marsh)	N/A	Endangered	1993
Black-crowned Night-heron	Foraging	Saline Marsh (Low Marsh), Tidal Rivers, Inland Bays, And Other Tidal Waters	N/A	Threatened	2002
Raritan Bay Loop (Offshore)					
Atlantic Sturgeon	Migration Corridor - Adult Sighting	Open Tidal Bays,	N/A	Endangered	2015
Black-crowned Night-heron	Foraging	Open Tidal Bays,	N/A	Threatened	2002
Leatherback Sea Turtle	Occupied Habitat	Open Tidal Bays,	N/A	Endangered	2017
Loggerhead Sea Turtle	Occupied Habitat	Open Tidal Bays,	N/A	Endangered	2008
Shortnose Sturgeon	Migration Corridor - Adult Sighting	Open Tidal Bays,	N/A	Endangered	1989

Previous correspondence with the NJDEP have identified a documented bald eagle nest located along Cheesequake Creek; however, in an e-mail dated May 18, 2017, Mr. Kelly Davis, New Jersey Division of Fish and Wildlife, Office of Environmental Review, indicated that the project area does not extend into the 660 ft regulated nest buffer of the documented nest. A review of the New Jersey Bald Eagle Project, 2024 (NJDEP Fish & Wildlife) does not identify a bald eagle nest within the vicinity of Cheesequake Creek. Three active nests (nest #594, 603, 740) and one territorial nest (#724) north of the Madison and Raritan Bay Loop near the Raritan River. In addition, one territorial nest (#595) is located south of the project near Matawan Creek.

According to the 2024 Osprey Project in New Jersey report[15] published by NJ Division of Fish and Wildlife, Endangered and Nongame Species Program, there are 45 documented osprey nests within the area known as "Raritan Bay & Bay". A crosscheck of the non-profit website, "Osprey Watch", indicates several nests are located within the vicinity of the Cheesequake State Park. Three nests (nest ID 072-A-014, 072-A-007, and Catenary L Pole) are located within 300 meters of the Project area workspace. Nest 072-A-014 is near the Madison Loop centerline from MP11.57 to MP11.85 was active in 2017, but has no data available for 2018, 2019 and 2025. The second nest near the offshore portion of the Raritan Bay Loop centerline from MP12.37 to MP12.41 was active in 2018 but has no data available in 2025. Nest Catenary L Pole is located along the Raritan Bay Loop (onshore) near Route 35 NJ Transit bridge. Nest status is unknown for 2025 but was active in 2024.

Per guidance from Christina Albizati, NJDEP, dated April 8, 2019 (File # 0000-01-1001.3), the wetlands depicted on sheets 10, 11, 12, and 13 of Transco's Freshwater Wetland Permit Plans that are West of Gondeck Drive (~ MP11.42) are not considered exceptional resource value wetlands and do not contain suitable threatened and endangered species habitat.

The 2025 and 2019 NHP letters also identified the pine barrens treefrog, a state-listed endangered species, as potentially breeding in vernal pools within 1 mile of the Madison Loop. New Jersey's Landscape Project identifies pine barrens treefrog habitat approximately 0.75 mile south of the Madison Loop. Given the mapped location of this species outside of the workspace for the proposed Project, Transco does not expect the Project will affect the pine barrens treefrog.

Impacts to wetlands and threatened and endangered species habitat will be avoided through the use of an HDD from MP11.49 to MP11.84. Construction activities along the remaining portions of the Madison Loop not crossed by HDD will impact areas of wetland that are identified as suitable foraging habitat for bald eagle, but it is anticipated that these impacts will be minor and/or temporary in nature and will not result in any significant, long-term, adverse impact to bald eagle or its foraging habitat.

Additionally, Transco will not conduct work inside the 300-meter buffer of an active osprey nest from April 1 through August 31. Impacts to osprey habitat will be minor and/or temporary in nature and will not result in any significant, long-term, adverse impact to osprey or its foraging habitat.

6.2.1 COMPRESSOR STATION 206

According to the NJDEP NHP response letter, dated June 5, 3025, for the Compressor Station 206 site, potential habitat for the barred owl (non-breeding sighting) is present within and immediately adjacent to the site (letters included in **Appendix A**). In 2017, no endangered or threatened species were identified by the NHP on the proposed Compressor Station 206 site (and previously proposed Trap Rock access road) in Franklin Township (letter dated June 23, 2017). However, in response to a report of a State-threatened barred owl near Compressor Station 206, NJDEP biologists conducted an inspection of the site and contiguous forested area on April 4, 2019. The site visit resulted in NJDEP's acceptance of the sighting report as valid due to the presence of suitable forested habitat conditions on site and the larger contiguous forested area. Transco has conducted additional detailed engineering to reduce the impacts to the potential onsite habitat for the barred owl which comprises the exceptional value forested wetlands and transition

15 https://conservewildlifenj.org/wp-content/uploads/2025/03/2024-NJ-Osprey-Project-Report.pdf

areas. As a result, Transco has eliminated the impacts to exceptional resource value forested wetland transition areas and wetlands associated with the access road and compressor station facility.

Due to the potential presence of suitable barred owl habitat within the vicinity of the Compressor Station 206, a barred owl presence/absence survey was conducted on Block 5.02, Lot 25 during the breeding season on April 14, April 17, April 23, April 30 and May 13, 2025. The methodology used for the presence/absence survey was the technique/survey methodology outlined in the *Protocols for the Establishment of Exceptional Resource Value Wetlands Pursuant to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 Et Seq.) Based on Documentation of State or Federal Endangered or Threatened Species*, last updated January 2013, as prepared by the NJDEP Land Use Regulation Program, Office of Natural Lands Management, Division of Parks & Forestry and The Division of Fish, Game & Wildlife Endangered and Nongame Species Program. The survey methodology also followed the methodologies outlined within the *Woodland Raptor Survey Protocol* developed by the NJDEP Division of Fish and Wildlife and the Conserve Wildlife Foundation of New Jersey.

Call Playback Vocalization Survey Results: There were neither return calls nor visual observations of barred owl during any of the call playback surveys on the site. The survey noted marginal levels of anthropogenic noise audible from surrounding areas including distant cars and dogs from nearby residences barking in response to call playbacks. Although this noise had no bearing on our ability to hear nocturnal animal calls emanating from the site or vicinity, it provides further evidence of habitat degradation of the site for this forest-interior sensitive species. Natural responses were dominated by coyotes and amphibians, although a great horned owl was heard off-site to the west during the April 17 survey. Although the site is primarily associated with undeveloped forest, anthropogenic features dominate the immediate vicinity including an active quarry. It is likely that these features and existing operations have diminished habitat suitability for the barred owl.

Nesting Survey Results: The survey for potential nest trees resulted in the observation of several trees of sufficient size (i.e., +/- 20" dbh) for barred owl; however, most of these features do not contain suitable interior cavities or platform stick nests to support potential nesting by barred owl. Additionally, there was no observation of scat, cough pellets, prey remains or feathers at the bases of these trees or any other trees within the site. Several small dbh snags were observed on-site that fall well under the typical dimension of a barred owl host tree, and these were also absent of potential nesting cavities. Portions of the site which have been historically associated with the utility easement are primarily comprised of emergent vegetation and early successional sweet gum stands. No evidence of nesting activities were observed on site. The results of the nesting survey conclude that the site is absent of barred owl nest trees. The negative survey results suggest that the site is absent of habitat critical to the survival of a local population of barred owl.

A full presence/absence survey resulted in the absence of barred owl from the site and immediate vicinity. Based on the surveys and investigations performed, the following findings are made in support of the conclusion that critical habitat for a local population of barred owl is absent from the site:

- A full presence/absence call playback survey (five visits) during the latter portion of the breeding season resulted in the absence of barred owl from the site and vicinity;
- Four full site nesting investigations resulted in the absence of potentially critical nest trees from the site;
- A portion of the site was historically developed/disturbed and currently occupied by a utility easement which is routinely maintained
- Trafficked roadways, dogs, coyotes and other residential disturbances produce noise levels that are unfavorable for this forest-interior dwelling species;

The negative vocalization survey results provide strong evidence that the subject site and vicinity do not provide critical habitat for barred owl. Considering the absence of return vocalizations and no evidence of on-site inhabitation, the subject site does not currently provide critical habitat for the barred owl. A complete copy of the Barred Owl Presence/Absence Survey Report is provided in **Appendix N**.

In total, the construction and operation of Compressor Station 206 will result in the removal of 0.538 acres of NJDEP identified suitable barred owl foraging habitat. Transco does not have access to the private properties surrounding the compressor station site and was therefore unable conduct surveys for the purpose of identifying the full extent of potentially suitable habitat for the barred owl. In lieu of field surveys, Transco applied the methodology outlined in Appendix V of the New Jersey Landscape Project, Version 3.3, to calculate the total area of potentially suitable habitat surrounding the Compressor Station 206 site. When the barred owl sighting is added to the Landscape Project, Transco expects NJDEP will apply the same methodology to identify suitable foraging habitat in this area. In Appendix V of the New Jersey Landscape Project, Version 3.3, 20 different Land Use / Land Classification types have been identified as potentially suitable habitat for barred owl. Additionally, the appendix notes that the patches should be contiguous as barred owls tend to reside in larger forest patches. The Landscape Project also identifies upland forest types as potentially suitable habitat. Using these methods, Transco determined that the total contiguous area of potentially suitable barred owl habitat surrounding the Compressor Station 206 site is more than 800 acres, with 381 acres being forested wetlands. The project will only impact a small percentage of this potentially suitable barred owl habitat. Given the placement of the compressor station site on the western edge of this potential habitat block, the removal of 0.538 acres of forested wetland habitat is unlikely to jeopardize or adversely modify the foraging opportunities available for the barred owl as the conversion will occur along the very edge of the contiguous forest block. Additionally, the removal of the 0.538 acres of foraging habitat will not jeopardize the continued existence of the local population of the barred owl, as more than 800 acres of contiguous forested habitat, will remain available to foraging owls. As described throughout this application, Transco has implemented a detailed engineering design process to minimize impacts on existing forest, PFO wetlands, and potential barred owl habitat to the maximum extent practicable.

Finally, operation and maintenance of Compressor Station 206 will not jeopardize the continued use of the site by the barred owl. The design of Compressor Station 206 includes measures such as directional lighting and sound-attenuating insulation, which will minimize disturbance to wildlife. Additionally, human and vehicle activity associated with the operation and maintenance of the site are not expected to have a significant impact on the barred owl and are consistent with activities on the surrounding residential, commercial, and industrial properties.

6.3 U.S. Fish and Wildlife Service Information of Planning and Consultation

The U.S. Fish and Wildlife Service (USFWS) Information of Planning and Consultation (IPaC) Database was reviewed to determine if any federally threatened or endangered species and their critical habitat are present within the project. IPaC is a digital planning tool utilized to help determine if proposed Projects will have an effect on federally listed species or designated critical habitat. USFWS maps of federally listed species ranges and designated critical habitat are utilized to generate the list of species potentially occurring within a project area. According to the IPaC Report, two (2) endangered, one (1) proposed endangered, two (2) threatened, and two (2) proposed threatened species may occur within the project **(Table 14)**. No critical habitats for federal-listed threatened or endangered species are identified within the project.

The USFWS, in a letter dated January 27, 2026, concurred the proposed Project "may affect but is not likely to adversely affect" Indiana bat, Rufa red knot, and Roseate tern (letter included in **Appendix A**). In addition, the project will have no effect on swamp pink. Although, monarch butterfly, tricolored bat, and green floater may occur within the action area, the Project is not likely to jeopardize the continued existence of the monarch butterfly, tricolored bat, or green floater; therefore, ESA Section 7(a)(4) conference is not required.

The USFWS, in a letter dated April 17, 2017, indicated that the federally endangered Indiana bat could occur within the Compressor Station 206 Project area during the active season (April 1 through September 30). To avoid impacts to the Indiana bat and tricolored bat, Transco will not clear trees ≥5 inches diameter at breast height during the active season. The federally (threatened) northern long-eared bat could occur within both the Compressor Station 206 and Madison Loop Project areas. However, no documented northern long-eared bat maternity roosts or hibernacula occur near either of the Project areas. The time-of-year restriction for Indiana bats at Compressor Station 206 will also reduce potential impacts on the northern long-eared bat.

TABLE 14. USFWS IPAC SPECIES IDENTIFIED WITHIN THE VICINITY OF THE PROJECT

Name	Federal Status	Designated Critical Habitat in Project
Compressor Station 206		
Indiana Bat	Endangered	No
Tricolored Bat	Proposed Endangered	No
Green Floater (clam)	Proposed Threatened	No
Monarch Butterfly	Proposed Threatened	No
Madison Loop		
Tricolored Bat	Proposed Endangered	No
Rufa Red Knot	Threatened	No
Monarch Butterfly	Proposed Threatened	No
Swamp Pink	Threatened	No
Raritan Bay Loop (Onshore & Offshore)		
Piping Plover	Threatened	No
Roseate Tern	Endangered	No
Rufa Red Knot	Threatened	No
Monarch Butterfly	Proposed Threatened	No

The USFWS indicated that there was a historical occurrence of the federally threatened swamp pink close to the Madison Loop. However, surveys of suitable habitat did not document any occurrences of swamp pink. The USFWS concurred with this finding. Therefore, the Project will not affect swamp pink.

The USFWS indicated that the federally threatened piping plover nests along the northern point of the Sandy Hook Unit of the Gateway National Recreation Area. Additionally, the federally threatened red knot may occur on the northern point of the Sandy Hook Unit during the spring migration (mid-May through early June) and fall migration (late-July through November). The federally threatened seabeach amaranth also occurs along the Sandy Hook Unit. Because Project construction would be 1-mile or more from these potential occurrences of listed species, the USFWS has indicated that the Project is not likely to adversely affect the piping plover, red knot, or seabeach amaranth.

The USFWS New Jersey Field Office indicated that the federally endangered roseate tern could occur transiently over the offshore Project area. The New Jersey Field Office has deferred comment on potential impacts to the roseate tern to the Long Island Field Office. In response to FERC for the EIS for the Project, the Long Island Field Office indicated that Rockaway Point provides marginally suitable breeding habitat for the roseate tern, but that there have been no records of breeding or important forage areas occurring either on or in the vicinity of Rockaway Point since 1998. Therefore, the USFWS indicated that the Project is not likely to adversely affect the roseate tern.

7.0 RIPARIAN ZONES

Riparian zone width for regulated streams within the Project Area was determined pursuant to N.J.A.C. 7:13-4.1. Tributaries associated with a Category 1 water were assigned a riparian width of 300 feet; while streams flowing through an area that contains a threatened or endangered species that are critically dependent on regulated water for survival was assigned a riparian width of 150 feet and other regulated waters not identified with the previous ones were assigned a riparian width of 50 feet.

None of the waterways within the project are designated as or located upstream of Category 1 (C1) waters, trout production waters, and/or trout maintenance waters. Crosswick Creek and Cheesequake Creek are both identified as potential habitat for threatened or endangered species that are critically dependent on water for survival. Therefore, the riparian zone associated with Tennent Brook, Carters Brook, and their tributaries are 50 feet from the top-of-bank; while riparian zone associated with Cheesequake Creek, Crossway Creek, and their tributaries are 150 feet from the top-of-bank. Riparian widths for regulated streams as well as Surface Water Quality Standards (N.J.A.C. 7:7b) within the Project Area are included in **Table 15**. Additional information regarding the delineated watercourses is provided in the wetland delineation report (**Appendix E**).

8.0 CULTURAL RESOURCES

8.1 ARCHITECTURAL

On the Compressor Station 206 parcel in Somerset County, a ruined early 20th century domestic building (Site 28-SO-166) was identified. Both architectural and archeological investigations were conducted for the house ruin and its associated parcel; the archaeological findings are related below. The house ruin and the parcel were analyzed applying the National Register Criteria for Evaluation for significance and integrity (36 CFR 60.4[a-d]).Based on that analysis, it was concluded that, Site 28-SO-166 does not possess those qualities of significance and integrity defined in the National Register of Historic Places Criteria for Evaluation (36 CFR 60.4 [a-d]), and does not represent an historic property, as defined in 36 CFR 800.16(l). The study area for the APE for visual effects around the Compressor Station 206 parcel initially was proposed as a 0.5-mile radius from the parcel boundaries. However, the viewshed surrounding the proposed compressor station was found to be limited due to tree buffers that will be retained around the new station and the existing tree cover on adjoining parcels. Large areas surrounding the Compressor Station 206 parcel currently are devoid of built resources. No further architectural investigations appear warranted or are recommended for Compressor Station 206. The NJ HPO concurred with the assessment of the Compressor Station 206 parcel on March 22, 2017.

The Madison and Raritan Bay (onshore) loops will be installed under three linear resources that are currently eligible for listing on the National Register of Historic Places. The Garden State Parkway, the Old Spye Road, and the New York and Long Branch Railroad will be traversed using HDD and conventional boring techniques; as a result, all surface impacts to these resources are expected to be avoided. Seven built resources 50 years of age or older were also identified as part of the architectural investigation. These seven resources were evaluated as not possessing the qualities of significance and/or integrity in accordance with the National Register Criteria for Evaluation (36 CFR 60.4[a-d). Further, no historic properties, as defined in 36 CFR 800.16(l) were found to be affected by the proposed Project. No further architectural investigations appear warranted or are recommended for the Madison Loop or the Onshore Raritan Bay Loop. The NJ Historic Preservation Office (HPO) concurred with this assessment on March 22, 2017. Transco reviewed the NJDEP LUCY online database in May 2025 and confirmed that there were no new properties since 2020 that have been identified as eligible or potentially eligible for listing as historic properties under the NHRP.

TABLE 15. DELINEATED WATERCOURSES AND ASSOCIATED RIPARIAN WIDTHS

WATERCOURSE ID	WATERCOURSE NAME	MILEPOST	TYPE	STATE FISHERY CLASSIFICATION	RIPARIAN WIDTH
Compressor Station 206					
WW-T09-001	UNT to Carters Brook	CS206	Ephemeral	FW2-NT	50
WW-T09-002	UNT to Carters Brook	CS206	Perennial	FW2-NT	50
WW-T13-001	UNT to Delaware and Raritan Canal	CS206	Intermittent	FW2-NT	50
WW-T13-002	UNT to Delaware and Raritan Canal	CS206	Ephemeral	FW2-NT	50
WW-T13-003					
Madison Loop					
WW-T01-001	UNT to Tennent Brook	8.61	Intermittent	FW2-NT	50
WW-T01-001A	UNT to Tennent Brook	8.62	Ephemeral	FW2-NT	50
WW-T01-002B	UNT to Tennent Brook	8.76	Ephemeral	FW2-NT	50
WW-T01-002A	UNT to Tennent Brook	8.76A	Ephemeral	FW2-NT	50
WW-T01-002 /WW-T15-001	UNT to Tennent Brook	8.76	Intermittent	FW2-NT	50
WW-T15-002	UNT to Tennent Brook	9.08	Intermittent	FW2-NT	50
WW-T15-002A	UNT to Tennent Brook	9.08	Intermittent	FW2-NT	50
WW-T15-003	UNT to Tennent Brook	9.02	Intermittent	FW2-NT	50
WW-T15-004 / WW-T15-004A	UNT to Tennent Brook	9.21	Intermittent	FW2-NT	50
WW-T15-004B	UNT to Tennent Brook	9.26	Intermittent	FW2-NT	50
WW-T15-005	UNT to Tennent Brook	9.26	Ephemeral	FW2-NT	50
WW-T01-004	UNT to Cheesequake Creek	10.05	Intermittent	FW2-NT	50
WW-T01-003	UNT to Cheesequake Creek	10.72	Intermittent	FW2-NT	0
WW-T07-001	UNT to Crossway Creek	11.36	Perennial	SE1	150
WW-RS-005	UNT to Cheesequake Creek	11.55	Perennial	SE1	150
WB-T01-001	Tidal Reach of Cheesequake Creek	11.72	Estuary	SE1	150

8.2 ARCHAEOLOGICAL

One newly identified historic archeological site (Site No. 28-SO-166) at the Compressor Station 206 parcel and one previously recorded multi-component (historic and prehistoric) archaeological site (Site No. 28-MI-169) along the onshore portion of the Raritan Bay Loop were identified during cultural resource surveys. Within the survey corridor, Site No. 28-SO-166, yielded 14 historic artifacts associated with a ruined house and a concrete foundation. Site No. 28-MI-169 yielded 3 prehistoric lithic artifacts and 45 historic artifacts. Elsewhere, no historic properties, as defined in 36 CFR 800.16(l), will be affected by the proposed Project.

Site No. 28-SO-166: For Site No. 28-SO-166, the twentieth century date of the site, the limited amount of cultural material recovered, and the absence of evidence for intact deposits suggest that the site does not possess sufficient research potential to yield information that is important in history. As such, 28-SO-166 does not possess those qualities of significance and integrity defined in the NRHP Criteria for Evaluation (36 CFR 60.4 [a-d]), and does not represent an historic property, as defined in 36 CFR 800.16(l). As a result, no further archeological investigation is recommended. The NJ HPO concurred with this assessment on March 30, 2017.

Site No. 28-MI-169: The current investigations at Site No. 28-MI-169 have yielded no information to contradict the possible Middle to Late Woodland lithic scatter/habitation site and nineteenth to twentieth century domestic occupation known from previous cultural resource investigations. As a result, the portion of 28-MI-169 within the survey corridor may possess those qualities of significance and integrity defined in the NRHP Criteria for Evaluation (36 CFR 60.4 [a-d]), and represent an historic property, as defined in 36 CFR 800.16(l). Current construction plans indicate that the site will be avoided by proposed HDD; depths associated with the activity will be approximately 70 to 90 feet in the site area. Assuming the site is avoided by these means, no further archeological investigation is warranted or recommended. The NJ HPO provided comments on Site No. 28-MI-169 on March 30, 2017. Transco evaluated the potential risks associated with an inadvertent release during the proposed HDDs as part of the feasibility analysis and design process. Transco's evaluation indicated the HDD will have a much lower relative risk of inadvertent release and therefore Transco does not expect impacts upon the geologic matrix at Site No. 28-MI-169. The NJ HPO concurred with this assessment on June 8, 2017.

Higgins Farm Access Road: A portion of the Higgins Farm access road falls within the survey boundary that NJ HPO has previously concurred with. A majority of the remaining Higgins Farm access road is co-located with an existing EPA access road and has therefore been subject to prior disturbance from clearing and grading activity. Therefore, Transco does not anticipate that cultural resources would be found within the co-located portion of the access road.

In lieu of an archaeological field survey of the remaining portion of access road, which is not within Transco's previous cultural resources survey boundary and which is not co-located with the existing access road, Transco commits to having a qualified archaeological monitor onsite during all phases of construction involving ground disturbance of the Higgins Farm access road. This would include ground disturbance associated with road improvements and extension and storm water management features. Transco has submitted a request from the NJ HPO that having archaeological monitors onsite during construction of the EPA access road is acceptable in lieu of archaeological field surveys and will provide DLUR with the results of this request upon its receipt.

9.0 HYDRODYNAMIC AND SEDIMENT TRANSPORT MODELING (RARITAN BAY LOOP - OFFSHORE)

9.1 SEDIMENT MODELING METHODOLOGY

Transco conducted project-specific hydrodynamic and sediment transport and dispersion modeling for a suite of installation methods proposed for the Raritan Bay Loop to numerically predict the suspended sediment plumes and areas of deposition that may be generated by the offshore construction, to better estimate potential impacts from suspended and deposited sediments, and to help determine appropriate avoidance and minimization measures. This

consisted of two interconnected modeling tasks, which are described in detail in the Hydrodynamic and Sediment Transport Modeling Results (Modeling Reports) (see **Appendix L**):

- Development and calibration of a three-dimensional hydrodynamic model for the New York/New Jersey Harbor Estuary and nearby waters of the Atlantic Ocean; and
- Simulations of the suspended sediment fate, transport, plumes, and deposition that could result from Project-specific offshore construction activities.

9.2 MODEL DESCRIPTION

The following is a summary of the Suspended Sediment FATE (SSFATE) modeling system and results. A description of the WQMAP/BFHYDRO modeling system and the full summary of the results are presented in the Hydrodynamic and Sediment Transport Modeling Reports (**Appendix L**).

The SSFATE model is a three-dimensional Lagrangian (particle) model that was developed cooperatively by the USACE Environmental Research and Development Center and Applied Science Associates. SSFATE was initially developed to simulate and compute total suspended solids (TSS) concentrations (sediment resuspension) and deposition from marine dredging operations. The model was developed further to simulate cable and pipeline installations with water jet trenchers and mechanical ploughs, in addition to sediment dumping and dewatering. One of the inputs required of the SSFATE is a spatial- and time-varying circulation field, which is obtained from a hydrodynamic model. Currently, SSFATE works with a geographic information system–based interface that allows for visualization and spatial analysis of model results.

SSFATE has been applied to more than a dozen sediment-dispersion modeling studies in the vicinity of the Project, including portions of the lower Hudson River, Upper New York Bay, Gowanus Bay, Arthur Kill, the Long Island Sound, and the Great South Bay. The majority of these previous studies used a modeling approach similar to that used for the Project, which included the use of the WQMAP/BFHYDRO and SSFATE models to evaluate sediment resuspension and deposition from sediment-disturbing activities. Examples of these previous studies are provided in the Modeling Reports (**Appendix L**).

9.3 SEDIMENT MODELING RESULTS

Transco performed modeling summaries and corresponding modeling reports for the following iterations of offshore construction scenarios:

- Hydrodynamic and Sediment Transport Modeling Results – Base Case Simulations (August 2017) (Base Case): 14 excavation scenarios using a conventional clamshell bucket, provided as **Appendix L-. Figures 10 through 35** depict the scenarios **(see Additional Figures)**;
- Hydrodynamic and Sediment Transport Modeling Results – Addendum 1 (October 2017) (Addendum 1): 13 backfill-related scenarios, using a conventional clamshell bucket, provided as **Appendix L-. Figures 36 through 49** depict the scenarios **(see Additional Figures)**;
- Hydrodynamic and Sediment Transport Modeling Results – Addendum 2 (April 2018) (Addendum 2): 22 construction scenarios incorporating multiple adjustments to previously modeled scenarios, including use of an environmental bucket, and reductions in clamshell dredge loss and scow overflow rates, provided as **Appendix L- Figures 50 through 88** depict the scenarios **(see Additional Figures)**; and
- Hydrodynamic and Sediment Transport Modeling Results – Addendum 3 (September 2018) (Addendum 3): 13 construction scenarios incorporating multiple adjustments to previously modeled scenarios, including deeper burial across navigation channels and an anchorage area and reductions in clamshell dredging rates, provided as **Appendix L-4. Figures 89 through 105** depict the scenarios **(see Additional Figures)**.

The results of Transco's hydrodynamic sediment modeling provide the predicted TSS concentrations of 50 milligrams per liter (mg/L) and 100 mg/L above ambient levels (see **Table 16**, below). Transco conducted the modeling using these TSS concentration thresholds because they represent default values for chronic and acute toxicity thresholds, respectively, for aquatic organisms (i.e., for dredged material that has not undergone suspended phase toxicity testing) (NYSDEC 2004). However, New Jersey surface water quality standards (SWQSs) (N.J.A.C. 7:9B-1.14(d)) dictate a maximum (instantaneous) turbidity threshold of 30 nephelometric turbidity units (NTU) for SE1 class waters and a maximum turbidity threshold of 10 NTU for SC class waters (i.e., the classifications for waters that will be crossed by the Raritan Bay Loop. SE1 waters are crossed between MP12.16 and MP14.01 and between MP26.55 and MP28.30, while SC class waters are crossed between MP28.30 and MP30.64). As described above, the model used for the Project was designed to simulate and compute TSS concentrations and deposition and therefore does not directly predict levels of turbidity. Applying a standard direct conversion between TSS concentrations and turbidity for the entire length of the Raritan Bay Loop is not feasible, as the relationship between TSS concentration and turbidity is site-specific and can vary widely depending on concentrations of suspended particles, as well as other particle characteristics such as size, shape, surface area, color, etc. Typically, however, a generally linear relationship between TSS and turbidity can be established for relatively homogenous sediments. For example, turbidity-to-TSS correlations ranging from approximately 1 NTU to 1 mg/L and 1 NTU to 6 mg/L have been reported for other freshwater and marine environments around the United States (Anchor Environmental CA, L.P. 2003; Holliday et al. 2003). Assuming a ratio of 2 mg/L per 1 NTU, a concentration of 50 mg/L would yield a result of roughly 25 NTU. Assuming a ratio of 6 mg/L per 1 NTU, a concentration of 50 mg/L would yield a result of roughly 8 NTU. In comparison, the turbidity standard listed in NJAC 7:9B is a maximum of 30 NTUs at any time for Class SE1/SE2 saline waters and 10.0 NTUs for Class SC saline waters. Therefore, use of the modeling results for TSS concentrations of 50 mg/L appears to be a reasonable proxy for identifying the distance at which compliance with the NJDEP water quality standard for turbidity would be achieved.

The following summaries of each modeling report are discussed with respect to TSS concentrations of 50 mg/L and 100 mg/L above ambient levels.

9.3.1 Summary of Base Case Results

For modeling purposes, offshore construction activities were divided into 14 distinct scenarios. Modeling results are based on conservative (i.e., overestimated) but realistic assumptions from contractor estimates and field observations. For a full discussion of modeling results and model output figures, see the Base Case modeling report (**Appendix L-1**). Each scenario was modeled under the following assumptions:

- Continuous operation will occur for all construction phases, with short breaks for activities involving multiple equipment passes or equipment changes;
- Reported sediment concentrations will be above ambient concentration in the Project area; and
- Sediment concentrations are calculated with a horizontal grid resolution of 20 by 20 meters and a vertical grid resolution of 0.5 meter.

The sediment dispersion and deposition modeling results for sedimentation rates and the extent of sedimentation for each scenario are provided in **Table 16**.

TABLE 16. COMPREHENSIVE SUMMARY OF SIMULATION RESULTS

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
Excavation/Dredging/Trenching Activities																		
(i) MP12.50 (ii)~1,200 ft north of MP12.32 NJ	Base Case	Scenario 1	Excavation activities at Morgan Shore	Excavation of Morgan Shore HDD pit (MP12.50)	Clamshell	11,250	23.8	10	993	3.33	1,969	1,099	482	269	154	7.4	2.7	0.9
				Excavation of anode sled burial area (~1,200 ft north of MP12.32)	Clamshell	11,250	1.2	10	49									
	Addendum 2	Scenario B-4	Excavation activities at Morgan Shore (0.5% loss)	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	24.9	0.5	52	0.4	328	148	102	0	0	0.5	0	0
MP12.50 - MP16.60 NJ/NY	Base Case	Scenario 2	Pre-lay trenching between Morgan HDD exit and the Midline tie-in	--	Clamshell	11,250	513.8	10	21,408	9.87	5,233	4,331	148	108	62	39.9	16.9	5.2
	Addendum 2	Scenario B-1	Pre-lay trenching between Morgan HDD pit and the Midline tie-in (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	422.3	2.5	4,392	1.7	2,428	591	89	26	0	11.1	0.5	0
	Addendum 2	Scenario B-2	Pre-lay trenching between Morgan HDD pit and the Midline tie-in (0.5% loss; no scow overflow)	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	422.3	0.5	878	0.4	262	0	0	0	0	0	0	0
	Addendum 2	Scenario B-3	Post-lay trenching between Morgan HDD pit and the Midline tie-in (2 passes; 5% loss)	--	Jet Trencher	29,135	66	5	3,559	0.2	2,018	1,476	97	0	0	13.0	0	0
MP 13.88 NJ	Base Case	Scenario 3	Jetting at the Neptune Cable crossing point in Raritan Bay	--	Hand Jet	360	149.2	100	1,989	3.35	2,592	1,378	958	413	236	10.7	3.9	1.1

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
MP 16.60 - MP 17.23 NY	Base Case	Scenario 4	Post-lay trenching between the Midline tie-in and Raritan Channel transition @ 29,135 ft3/hr	Pass 1 (W to E)	Jet Trencher	29,135	5.8	5	311	6.91	1,591	1,001	36	0	0	0.1	0	0
				Pass 2 (E to W)	Jet Trencher	29,135	5.8	5	311									
MP17.23 - MP17.97d NY	Base Case	Scenario 8	Pre-lay trenching across the Raritan Channel	--	Clamshell	11,250	456.8	10	19,031	7.58	5,446	2,822	427	112	23	29.7	7.8	0
	Addendum 2	Scenario B-5	Pre-lay trenching across the Raritan Channel (0.5% loss)	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	321.6	0.5	668	0.5	0	0	0	0	0	0	0	0
	Addendum 3	Scenario C-1	Clamshell dredge Raritan Channel deep prism (15-ft cover depth) with no scow overflow	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	858	0.5	1,788	0	131	--	0	0	0	0	0	0
MP17.89 - MP24.00 NY	Base Case	Scenario 5	Post-lay trenching between Curve 1 and Anchorage area (2 passes)	Pass 1 (W to E)	Jet Trencher	29,135	49.3	5	2,658	7.9	1,329	853	99	0	0	69.3	0	0
				Pass 2 (E to W)	Jet Trencher	29,135	49.3	5	2,658									
MP24.00 - MP25.20d NY	Base Case	Scenario 9	Pre-lay trenching between the anchorage area and the Chapel Hill Channel	--	Clamshell	11,250	299.9	10	12,497	4.39	722	131	197	148	109	49.4	35.3	19.2
	Addendum 2	Scenario B-6	Pre-lay trenching between the anchorage area and the Chapel Hill Channel (0.5% loss)	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	270	0.5	562	0	0	0	15	0	0	0.6	0	0
	Addendum 3	Scenario C-2	Clamshell dredge anchorage deep prism (15-ft cover depth) with no scow overflow	--	Clamshell	11,250	390.8	0.5	814	0.1	131	--	85	0	0	9.9	0	0

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
	Addendum 3	Scenario C-4	Clamshell dredge anchorage deep prism (15-ft cover depth) with scow overflow	--	Clamshell	11,250	390.8	2.5	4,071	0.5	262	197	174	112	13	24.1	14.7	0.2
MP24.00 to MP24.78c NY	Addendum 2	Scenario B-17	Side-cast across the anchorage area (100% loss)	--	Clamshell	11,250	154	100	64,311	0.9	6,283	3,084	390	259	161	53.8	36	22.8
MP24.70 - MP25.61 NY	Addendum 3	Scenario C-3	Clamshell dredge extended Chapel Hill Channel deep prism (15-ft cover depth) with no scow overflow	--	Clamshell	11,250	491.1	0.5	1,023	0.3	131	--	82	0	0	11.9	0	0
MP25.20 - MP29.52 NY/NJ	Base Case	Scenario 6	Post-lay trenching between Curve 4 and Ambrose Channel (2 passes)	Pass 1 (W to E)	Jet Trencher	29,135	34.8	5	1,879	1.35	410	262	79	0	0	52.1	0	0
				Pass 2 (E to W)	Jet Trencher	29,135	34.8	5	1,879									
MP29.52 NJ	Base Case	Scenario 10	Excavation of Ambrose Channel HDD exit pit (West)	--	Clamshell	11,250	33.7	10	1,405	12.45	9,039	2,756	502	397	289	6.4	3.8	1.6
	Addendum 2	Scenario B-7	Excavation of Ambrose Channel HDD pit (West) (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	33.7	2.5	351	1.1	443	0	371	253	0	3.6	1.2	0
	Addendum 2	Scenario B-8	Excavation of Ambrose Channel HDD pit (West) (0.5% loss)	--	Clamshell (Environmental Bucket w/ no scow overflow)	11,250	33.7	0.5	70	0	0	0	148	0	0	0.6	0	0
MP29.52c NJ	Addendum 2	Scenario B-18	Side-cast at the Ambrose HDD pit (West) (100% loss)	--	Clamshell	11,250	33.7	100	14,050	7.3	19,587	17,684	1,198	787	397	18.5	6.4	4.3
MP30.40 NJ	Base Case	Scenario 11	Excavation of Ambrose Channel HDD entry pit (East)	--	Clamshell	11,250	77.9	10	3,245	1.97	0	0	341	299	256	5.3	4	2.9

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time for TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
			Excavation of Ambrose Channel tie-in	--	Clamshell	11,250	5	10	209									
	Addendum 2	Scenario B-9	Excavation at the Ambrose HDD pit (East) and Ambrose Channel tie-in (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	83.5	2.5	869	0	0	0	295	243	187	3.8	2.7	1.4
MP30.40c NJ	Addendum 2	Scenario B-19	Side-cast at the Ambrose HDD pit (East) and Ambrose Channel tie-in (100% loss)	--	Clamshell	11,250	83.5	100	34,777	1.6	3,822	2,789	407	305	269	6.5	4.4	3.8
MP30.40 - MP35.19 NY/NJ	Base Case	Scenario 7	Post-lay trenching between Ambrose Channel and Neptune Crossing 35 (2 passes)	Pass 1 (W to E)	Jet Trencher	29,135	38.5	5	2,075	5.71	2,346	1,345	66	0	0	10.9	0	0
				Pass 2 (E to W)	Jet Trencher	29,135	38.5	5	2,075									
MP35.19 to MP35.49d NY	Base Case	Scenario 13	Pre-lay trenching between the Neptune crossing and end of pipeline	--	Clamshell	11,250	27	10	1,124	8.03	3,330	1,198	92	0	0	1.0	0	0
	Addendum 2	Scenario B-10	Pre-lay trenching between the Neptune Cable crossing and end of pipeline (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	31	2.5	329	0.6	656	0	138	0	0	2.0	0	0
MP35.19 to MP35.49c NY	Addendum 2	Scenario B-20	Side-cast between the Neptune Cable crossing and RDL (100% loss)	--	Clamshell	11,250	31.6	100	13,152	1.9	1,690	1,296	436	348	249	22.7	14.9	9.9
MP35.19 NY	Base Case	Scenario 12	Jetting at the Neptune Cable crossing offshore Rockaway	--	Hand Jet	180	279.2	100	1,861	0.66	591	197	548	394	171	5.4	2.9	1.2

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
MP35.49 NY	Base Case	Scenario 14	Excavation of tie-in skid and manifold at Rockaway	Tie-In Skid and Manifold Excavation (75% Mass Flow Excavator)	Mass Flow Excavator (Submersible Pump)	4,050	30.2	100	4,530	0.67	787	722	591	456	328	9.8	6.3	3.7
				Tie-In Skid and Manifold Excavation (25% Hand Jet)	Hand Jet	180	226.5	100	1,510									
Ambrose Channel NJ	Addendum 1	Scenario A-1	Dredging of backfill source material from Ambrose Channel	--	Clamshell	11,250	533	5	11,111	1	7,661	6,365	279	92	0	119.6	2.3	0
	Addendum 2	Scenario B-11	Dredging of backfill source material from Ambrose Channel (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	533	2.5	5,555	1	2,280	1,033	171	0	0	59.7	0	0
	Addendum 2	Scenario B-14	Dredging of backfill source material from Ambrose Channel (0.5% loss)	--	Clamshell (Environmental Bucket w/ NO scow overflow)	11,250	533	0.5	1,111	0	0	0	0	0	0	0	0	0
Rockaway Inlet NY	Addendum 1	Scenario A-2	Dredging of backfill source material from Rockaway Inlet	--	Clamshell	11,250	533	5	11,111	0.6	3,478	2,526	1,247	197	72	78.5	34.6	7.2
	Addendum 2	Scenario B-12	Dredging of backfill source material from Rockaway Inlet (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	533	2.5	5,555	0.2	3,757	2,116	299	131	0	46.5	15.6	0
	Addendum 2	Scenario B-15	Dredging of backfill source material from Rockaway Inlet (0.5% loss)	--	Clamshell (Environmental Bucket w/ NO scow overflow)	11,250	533	0.5	1,111	0.2	197	0	79	0	0	7.5	0	0
U.S. Navy Earle Channel	Addendum 1	Scenario A-3	Dredging of backfill source material from U.S. Navy Earle Channel	--	Clamshell	11,250	533	5	11,111	0.8	6,365	3,888	187	59	0	114.9	3	0

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
NJ	Addendum 2	Scenario B-13	Dredging of backfill source material from U.S. Earle Channel (2.5% loss)	--	Clamshell (Environmental Bucket w/ scow overflow)	11,250	533	2.5	5,555	0.8	5,331	1,099	128	0	0	25.5	0	0
	Addendum 2	Scenario B-16	Dredging of backfill source material from U.S. Earle Channel (0.5% loss)	--	Clamshell (Environmental Bucket w/ NO scow overflow)	11,250	533	0.5	1,111	0.5	0	0	0	0	0	0	0	0
Backfill Activities																		
(i) MP12.50 (ii)~1,200 ft north of MP12.30 NJ	Addendum 1	Scenario A-4	Backfilling of (i) Morgan Shore HDD pit and (ii) anode sled burial area	--	Clamshell	11,250	31.7	100	13,205	2	1,362	886	404	305	253	9.4	6.6	4.8
MP12.50 to MP16.60 NJ/NY	Addendum 1	Scenario A-5	Backfilling of trench between Morgan HDD exit and the Midline tie-in	--	Clamshell	11,250	527	100	219,591	1.5	4,331	2,444	545	440	381	281.9	220.9	158.7
	Addendum 2	Scenario B-21	Backfill of trench between Morgan HDD exit and the Midline tie-in	--	Clamshell	7,500	794.1	100	219,591	1.2	2,641	1,329	453	364	282	280.5	222.6	161.5
	Addendum 3	Scenario C-11	Backfill of trench between Morgan HDD exit and the Midline tie-in @ 4,800 ft3/hr	--	Clamshell	4,800	1,235	100	219,591	1.1	1,460	591	525	420	266	314.6	250.3	183.2
MP13.88 NJ	Addendum 1	Scenario A-6	Backfilling of the Neptune Cable crossing point in Raritan Bay	--	Clamshell	11,250	5	100	2,095	3.5	1,903	1,247	427	371	197	4.4	2.9	1.6
MP17.23 to	Addendum 1	Scenario A-7	Backfilling of trench across the Raritan Channel	--	Clamshell	11,250	401	100	167,025	1.9	3,150	1,509	715	591	472	60.7	43.7	33.6

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time For TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
MP17.97d NY	Addendum 3	Scenario C-5	Backfill Raritan Channel base-case prism (up to 8-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	601.3	100	167,025	1.8	1,509	1,066	574	492	384	55.7	41.4	32.5
	Addendum 3	Scenario C-6	Backfill Raritan Channel deep prism (15-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	1,608.8	100	446,879	1.6	2,444	1,165	981	801	643	109.6	77.2	60.8
	Addendum 3	Scenario C-12	Backfill Raritan Channel deep prism (15-ft cover depth) @ 4,800 ft3/hr	--	Clamshell	4,800	2,513.7	100	446,879	1.1	1,575	853	817	653	574	105.6	76.8	61.5
MP24.00 - MP24.78d NY	Addendum 1	Scenario A-8	Backfilling of trench between the anchorage area and the Chapel Hill Channel	--	Clamshell	11,250	338	100	140,590	2.8	4,265	1,690	522	292	249	92.8	68.5	52.3
	Addendum 3	Scenario C-7	Backfill anchorage area base-case prism (7-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	289.4	100	80,388	1	1,755	1,247	371	318	253	55.3	43.4	33.5
	Addendum 3	Scenario C-8	Backfill anchorage area deep prism (15-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	732.8	100	203,545	1.3	1,772	919	453	371	325	63.4	49.6	39.7
MP24.70 - MP25.61d NY	Addendum 3	Scenario C-9	Backfill extended Chapel Hill Channel prism (up to 8-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	300.4	100	83,439	1.8	1,985	1,247	614	545	443	68.8	52.3	39.0
	Addendum 3	Scenario C-10	Backfill extended Chapel Hill Channel deep prism (15-ft cover depth) @ 7,500 ft3/hr	--	Clamshell	7,500	920.7	100	255,759	1.8	2,493	1,247	787	577	522	96.8	70.7	56.1

Location (MP and State)	Modeling Report	Scenario	Construction Activity[B]	Phase	Equipment Type	Production Rate (ft^3/hr)	Duration of Modeled Activity (hrs)	Equipment Sediment Loss (%)[B]	Total Volume Released (yd^3)	Time for TSS to Return to Ambient (hrs)	Max Distance of TSS Plume Exceeding Ambient (ft)		Max Distance of Deposition Exceeding (ft)			Area of Deposition Exceeding (acres)[A]		
											50 mg/L	100 mg/L	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]	0.3 cm [0.12 in]	1.0 cm [0.4 in]	3.0 cm [1.2 in]
MP29.52 NJ	Addendum 1	Scenario A-9	Backfilling of Ambrose Channel HDD exit pit (West)	--	Clamshell	11,250	42.2	100	17,563	3.3	3,871	1,952	945	804	525	16.5	8.5	5.1
	Addendum 2	Scenario B-22	Backfilling of Ambrose Channel HDD Pit (West)	--	Clamshell	7,500	63.2	100	17,563	1.3	1,788	1,526	948	755	499	15.1	8.9	5.1
MP30.40 NJ	Addendum 1	Scenario A-10	Backfilling of Ambrose Channel HDD entry pit (East) and tie-in	--	Clamshell	11,250	97.4	100	40,563	3	4,495	2,231	915	702	453	14.9	9.7	7.0
	Addendum 3	Scenario C-13	Backfill of Ambrose HDD Pit (East) and tie-in @ 4,800 ft3/hr	--	Clamshell	4,800	228.2	100	40,563	0.4	5,299	5,151	945	774	456	19.7	13.4	9.5
MP35.19 NY	Addendum 1	Scenario A-11	Backfilling at the Neptune Cable crossing offshore Rockaway	--	Clamshell	11,250	6.3	100	2,606	2.1	2,182	1,476	489	443	377	7.6	4.9	3.0
MP35.23 to MP35.49 NY	Addendum 1	Scenario A-12	Backfilling between the Neptune crossing and end of pipeline	--	Clamshell	11,250	34	100	14,197	2.3	2,493	1,493	633	531	335	26.8	19.6	12.0
MP35.49 NY	Addendum 1	Scenario A-13	Backfilling tie-in skid and manifold at Rockaway @ 11,250 ft3/hr	--	Clamshell	11,250	18.1	100	7,550	3	2,395	1,739	709	607	476	12.0	9.0	5.4

Note: Shaded entries reflect previously modeled sediment modeling scenarios that are no longer under consideration and are therefore not considered as part of total impact area calculations.
a Potential areas of impact for these scenarios do not include areas of deposition within the bounds of navigational channels, as these areas are considered to be regularly disturbed.
b A 100% sediment loss rate corresponds to the assumption that all the material is released into the water column at a height of approximately 5 feet above the ambient seafloor elevation. This assumption applies to the use of either an environmental bucket or conventional bucket.
c Transco no longer proposes to side-cast excavated materials at this location.

Key:
-- = Phase not identified in corresponding Modeling Report
cm = centimeters
E = east
ft = feet
ft3/hr = cubic feet per hour
ft3 = cubic feet
HDD = horizontal directional drill
hr = hour
in = inches
mg/L = milligrams per liter
MP = milepost
N = north
RDL = Rockaway Delivery Lateral
S = south
TSS = total suspended solids
W = west
yd3 = cubic yards

9.3.2 Suspended Sediment Summary (Base Case Modeling)

The predicted sediment plumes and TSS concentrations for "base case" scenarios varied in magnitude and scale along the entire offshore route (see **Table 16**). Sediment modeling results of the "base case" clamshell dredge activities indicated that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 0 and 4,331 feet from the source, and TSS concentrations would return to ambient conditions within 2.0 to 12.5 hours after the associated dredging has ceased. Sediment modeling results of the "base case" jet trencher activities indicated that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 262 and 1,345 feet from the source, and TSS concentrations would return to ambient conditions within 1.4 to 7.9 hours. Sediment modeling results for the hand jet and submersible pump indicated that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 197 feet and 1,378 feet from the source, and TSS concentrations would return to ambient conditions within 0.7 to 3.4 hours .

The modeling results are generally consistent with monitoring of several dredging events associated with recent deepening of the New York–New Jersey Harbor. Turbidity plumes generated during the harbor-dredging activities dissipated to ambient conditions within 656 feet in the upper water column and within 2,625 feet in the lower water column, even when dredging sediments were predominantly silt and clay (50% to 95%) (USACE 2015b). However, the maximum predicted extent of Project-generated TSS concentrations over 100 mg/L above ambient level is 4,331 feet from the source, suggesting that the "base case" modeling assumptions are conservative (i.e., overestimated). Nonetheless, the predicted plumes would be temporary, with TSS concentrations returning to ambient conditions within 12.5 hours after the associated dredging or trenching has ceased.

9.3.3 Sediment Deposition Results (Base Case Modeling)

The sediment modeling results for base case scenarios indicated that the sedimentation exceeding 3 centimeters (cm) (1.2 inches) resulting from clamshell dredge activities would range from 0 to 289 feet from the source and would cover between 0 and 19.2 acres. No sedimentation would exceed 3 cm (1.2 inches) if using the jet trencher. The sediment modeling results of the hand jet and submersible pump/suction dredge indicated that the sedimentation exceeding 3 cm (1.2 inches) would extend 171 to 328 feet from the source and would cover between 1.1 and 3.7 acres. For ease of NJDEP review, **Table 17** presents the modeled deposition results for all currently proposed activities that have the potential to affect New Jersey waters in terms of three representative levels of sedimentation, which may have varying degrees of adverse effects on benthic and demersal species and life stages. Table **18** provides estimates of the areal extent to which resource areas would be covered by Project-related sedimentation with thicknesses ranging from at least 0.3 centimeter (cm) (0.12 inch) to at least 3 cm (1.2 inches).

9.3.4 Summary of Addendum 1 Modeling Results

For modeling purposes, offshore backfill-related activities were divided into 13 distinct scenario (**Figures 36 through 49** depict the scenarios **(see Additional Figures)**. For a full discussion of modeling results and model output figures, see the Addendum 1 modeling report (**Appendix L-2**). These modeling scenarios were divided into two groups:

- Dredging of backfill source material (Scenarios A-1 through A-3); and
- Placement of backfill material (Scenarios A-4 through A-13).

Note that as part of this permit application, Transco is proposing to acquire backfill material from one or more existing commercial vendors.

TABLE 17 COMPREHENSIVE SEDIMENTATION IMPACTS[A,B]

Modeling Report	Modeled Scenario	Construction Activity	Equipment Type	Location	Deposition [minimum average]	NY Shellfish Lands (ac)		NYSDEC Special Harvest Areas (ac)		NJ Shellfish Waters (2016) (ac)		NJDEP 2014 Surfclam Bed (ac)	NJDEP 2014 Hard Clam Beds -Relative Abundance (ac)			NJDEP Sport Ocean Fishing Ground (ac)	Shallow Water (less than 20 feet MLLW)c (ac)
						Uncertified	Certified	Transplant-ation (Hard Clam)	Bait (Surfclam)	Prohibited	Special Restricted		High	Moderate	Low		
Base Case	1	Excavation activities at Morgan Shore	Clamshell	MP 12.50 and ~1,200 ft north of MP 12.30	0.3 cm [0.12 in]	--	--	--	--	7.43	--	--	7.43	--	--	--	7.43
					1.0 cm [0.4 in]	--	--	--	--	2.68	--	--	2.68	--	--	--	2.68
					3.0 cm [1.2 in]	--	--	--	--	0.89	--	--	0.89	--	--	--	0.89
Base Case	2	Pre-lay trenching between Morgan HDD exit and the Midline tie-in	Clamshell	MP 12.50 - MP 16.60	0.3 cm [0.12 in]	22.59	--	22.49	--	17.44	--	--	17.54	--	--	--	40.03
					1.0 cm [0.4 in]	7.53	--	7.53	--	9.41	--	--	9.41	--	--	--	16.94
					3.0 cm [1.2 in]	0.99	--	0.99	--	4.26	--	--	4.26	--	--	--	5.25
Base Case	3	Jetting at the Neptune Cable crossing point in Raritan Bay	Hand Jet	MP 13.88	0.3 cm [0.12 in]	--	--	--	--	10.70	--	--	10.70	--	--	--	10.70
					1.0 cm [0.4 in]	--	--	--	--	3.96	--	--	3.96	--	--	--	3.96
					3.0 cm [1.2 in]	--	--	--	--	1.09	--	--	1.09	--	--	--	1.09
Base Case	4	Post-lay trenching between the Midline tie-in and Raritan Channel transition (2 passes)	Jet Trencher	MP 16.60 - MP 17.31	0.3 cm [0.12 in]	0.10	--	0.10	--	--	--	--	--	--	--	--	0.10
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	5	Post-lay trenching between Curve 1 and anchorage area (2 passes)	Jet Trencher	MP 17.89 - MP 24.00	0.3 cm [0.12 in]	69.59	--	12.58	--	--	--	--	--	--	--	--	69.59
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	6	Post-lay trenching between Curve 4 and Ambrose Channel (2 passes)	Jet Trencher	MP 25.20 - MP 29.52	0.3 cm [0.12 in]	17.64	--	--	--	34.70	--	--	--	--	--	--	25.63
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	7	Post-lay trenching between Ambrose Channel and Neptune Crossing 35 (2 passes)	Jet Trencher	MP 30.40 - MP 35.19	0.3 cm [0.12 in]	9.10	--	--	0.10	0.38	--	--	--	--	--	7.42	2.32
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	8	Pre-lay trenching across the Raritan Channel	Clamshell	MP 17.31 - MP 17.89	0.3 cm [0.12 in]	24.53	--	24.53	--	--	--	--	--	--	--	--	24.53
					1.0 cm [0.4 in]	5.76	--	5.76	--	--	--	--	--	--	--	--	5.76
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	9	Pre-lay trenching between the anchorage area and the Chapel Hill Channel	Clamshell	MP 24.00 - MP 25.20	0.3 cm [0.12 in]	41.38	--	--	--	--	--	--	--	--	--	--	12.89
					1.0 cm [0.4 in]	29.41	--	--	--	--	--	--	--	--	--	--	9.55
					3.0 cm [1.2 in]	16.24	--	--	--	--	--	--	--	--	--	--	5.70
Base Case	10	Excavation of Ambrose Channel HDD exit pit (West)	Clamshell	MP 29.52	0.3 cm [0.12 in]	--	--	--	--	6.44	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	3.87	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	1.59	--	--	--	--	--	--	--
Base Case	11	Excavation of Ambrose Channel HDD entry pit (East) and tie-in	Clamshell	MP 30.40	0.3 cm [0.12 in]	--	--	--	--	5.32	--	--	--	--	--	5.35	5.35
					1.0 cm [0.4 in]	--	--	--	--	3.96	--	--	--	--	--	3.96	3.96
					3.0 cm [1.2 in]	--	--	--	--	2.87	--	--	--	--	--	2.87	2.87
Base Case	12	Jetting at the Neptune Cable crossing offshore Rockaway	Hand Jet	MP 35.19	0.3 cm [0.12 in]	--	5.45	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	2.87	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	1.19	--	--	--	--	--	--	--	--	--	--
Base Case	13	Pre-lay trenching between the Neptune crossing and the end of the pipeline	Clamshell	MP 35.23 - MP 35.49	0.3 cm [0.12 in]	--	0.99	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Base Case	14	Excavation of tie-in skid and manifold at Rockaway	Mass Flow Excavator (Submersible	MP 35.49	0.3 cm [0.12 in]	--	9.81	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	6.34	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	3.67	--	--	--	--	--	--	--	--	--	--

Modeling Report	Modeled Scenario	Construction Activity	Equipment Type	Location	Deposition [minimum average]	NY Shellfish Lands (ac)		NYSDEC Special Harvest Areas (ac)		NJ Shellfish Waters (2016) (ac)		NJDEP 2014 Surfclam Bed (ac)	NJDEP 2014 Hard Clam Beds -Relative Abundance (ac)			NJDEP Sport Ocean Fishing Ground (ac)	Shallow Water (less than 20 feet MLLW)c (ac)
						Uncertified	Certified	Transplant-ation (Hard Clam)	Bait (Surfclam)	Prohibited	Special Restricted		High	Moderate	Low		
			Pump) and Hand Jet														
Addendum 1	A-1	Dredging of backfill source material from Ambrose Channel[c]	Clamshell	Ambrose Channel	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	0.28	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 1	A-2	Dredging of backfill source material from Rockaway Inlet[c]	Clamshell	Rockaway Inlet	0.3 cm [0.12 in]	11.44	--	--	--	--	--	--	--	--	--	--	6.81
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 1	A-3	Dredging of backfill source material from U.S. Navy Earle Channel[c]	Clamshell	U.S. Navy Earle Channel	0.3 cm [0.12 in]	--	--	--	--	<0.01	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	-	--	--	--	--
Addendum 1	A-4	Backfilling of (i) Morgan Shore HDD pit and (ii) anode sled burial area	Clamshell	(i) MP12.50 (ii) 1,200 ft north of MP12.32	0.3 cm [0.12 in]	--	--	--	--	9.41	--	--	9.41	--	--	--	9.41
					1.0 cm [0.4 in]	--	--	--	--	6.64	--	--	6.64	--	--	--	6.64
					3.0 cm [1.2 in]	--	--	--	--	4.86	--	--	4.86	--	--	--	4.86
Addendum 1	A-5	Backfilling of trench between Morgan HDD exit and the Midline tie-in	Clamshell	MP12.50 to MP16.60	0.3 cm [0.12 in]	166.86	--	163.10	--	116.20	--	--	118.78	--	--	--	283.06
					1.0 cm [0.4 in]	130.67	--	127.67	--	91.16	--	--	93.19	--	--	--	221.83
					3.0 cm [1.2 in]	94.36	--	92.73	--	65.05	--	--	66.28	--	--	--	159.42
Addendum 1	A-6	Backfilling of the Neptune Cable crossing point in Raritan Bay	Clamshell	MP13.88	0.3 cm [0.12 in]	--	--	--	--	4.46	--	--	4.46	--	--	--	4.46
					1.0 cm [0.4 in]	--	--	--	--	2.87	--	--	2.87	--	--	--	2.87
					3.0 cm [1.2 in]	--	--	--	--	1.59	--	--	1.59	--	--	--	1.59
Addendum 1	A-7	Backfilling of trench across the Raritan Channel	Clamshell	MP17.31 to MP17.89	0.3 cm [0.12 in]	42.40	--	42.20	--	--	--	--	--	--	--	--	42.20
					1.0 cm [0.4 in]	29.71	--	29.71	--	--	--	--	--	--	--	--	29.71
					3.0 cm [1.2 in]	22.53	--	22.53	--	--	--	--	--	--	--	--	22.53
Addendum 1	A-8	Backfilling of trench between the anchorage area and the Chapel Hill Channel	Clamshell	MP24.00 to MP25.20	0.3 cm [0.12 in]	57.78	--	--	--	--	--	--	--	--	--	--	17.55
					1.0 cm [0.4 in]	57.78	--	--	--	--	--	--	--	--	--	--	17.55
					3.0 cm [1.2 in]	44.45	--	--	--	--	--	--	--	--	--	--	14.27
Addendum 1	A-9	Backfilling of Ambrose Channel HDD exit pit (West)	Clamshell	MP29.52	0.3 cm [0.12 in]	--	--	--	--	16.55	--	--	--	--	--	<0.01	--
					1.0 cm [0.4 in]	--	--	--	--	8.52	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	5.15	--	--	--	--	--	--	--
Addendum 1	A-10	Backfilling of Ambrose Channel HDD entry pit (East) and tie-in	Clamshell	MP30.40	0.3 cm [0.12 in]	--	--	--	--	13.79	--	--	--	--	--	14.96	14.49
					1.0 cm [0.4 in]	--	--	--	--	9.30	--	--	--	--	--	9.71	9.67
					3.0 cm [1.2 in]	--	--	--	--	6.91	--	--	--	--	--	7.04	7.04
Addendum 1	A-11	Backfilling at the Neptune Cable crossing offshore Rockaway	Clamshell	MP35.19	0.3 cm [0.12 in]	--	7.63	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	4.95	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	2.97	--	--	--	--	--	--	--	--	--	--
Addendum 1	A-12	Backfilling between the Neptune Cable crossing and end of the pipeline	Clamshell	MP35.23 to MP35.49	0.3 cm [0.12 in]	--	26.83	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	19.60	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	12.08	--	--	--	--	--	--	--	--	--	--
Addendum 1	A-13	Backfilling tie-in skid and manifold at Rockaway	Clamshell	MP35.49	0.3 cm [0.12 in]	--	12.09	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	9.02	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	5.45	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-1	Pre-lay trenching between Morgan HDD pit and the Midline tie-in (2.5% loss)c	Clamshell (environmental bucket with scow overflow)	MP12.50 to MP16.60	0.3 cm [0.12 in]	3.96	--	3.96	--	7.23	--	--	7.23	--	--	--	11.20
					1.0 cm [0.4 in]	0.10	--	0.10	--	0.40	--	--	0.40	--	--	--	0.50
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-2		Clamshell		0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--

Modeling Report	Modeled Scenario	Construction Activity	Equipment Type	Location	Deposition [minimum average]	NY Shellfish Lands (ac)		NYSDEC Special Harvest Areas (ac)		NJ Shellfish Waters (2016) (ac)		NJDEP 2014 Surfclam Bed (ac)	NJDEP 2014 Hard Clam Beds -Relative Abundance (ac)			NJDEP Sport Ocean Fishing Ground (ac)	Shallow Water (less than 20 feet MLLW)c (ac)
						Uncertified	Certified	Transplant-ation (Hard Clam)	Bait (Surfclam)	Prohibited	Special Restricted		High	Moderate	Low		
		Pre-lay trenching between Morgan HDD pit and the Midline tie-in (0.5% loss; no scow overflow)	(environmental bucket with no scow overflow)	MP12.50 to MP16.60	1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-3	Post-lay trenching between the Morgan HDD pit and the Midline tie-in (2 passes; 5% loss)	Jet Trencher	MP12.50 to MP16.60	0.3 cm [0.12 in]	6.04	--	6.04	--	7.04	--	--	7.04	--	--	--	13.08
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-4	Excavation activities at Morgan Shore (0.5% loss)	Clamshell (environmental bucket with no scow overflow)	(i) MP12.50 (ii) ~1,200 ft north of MP12.30	0.3 cm [0.12 in]	--	--	--	--	0.50	--	--	0.50	--	--	--	0.50
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-5	Pre-lay trenching across the Raritan Channel (0.5% loss)	Clamshell (environmental bucket with no scow overflow)	MP17.31 to MP17.89	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-6	Pre-lay trenching between the anchorage area and the Chapel Hill Channel (0.5% loss)	Clamshell (environmental bucket with no scow overflow)	MP24.00 to MP25.20	0.3 cm [0.12 in]	0.59	--	--	--	--	--	--	--	--	--	--	0.25
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-7	Excavation of Ambrose Channel HDD pit (West) (2.5% loss)[c]	Clamshell (environmental bucket with scow overflow)	MP29.52	0.3 cm [0.12 in]	--	--	--	--	3.57	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	1.19	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-8	Excavation of Ambrose Channel HDD pit (West) (0.5% loss)	Clamshell (environmental bucket with no scow overflow)	MP29.52	0.3 cm [0.12 in]	--	--	--	--	0.59	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-9	Excavation at the Ambrose HDD pit (East) and Ambrose Channel tie-in (2.5% loss)	Clamshell (environmental bucket with scow overflow)	MP30.40	0.3 cm [0.12 in]	--	--	--	--	3.77	--	--	--	--	--	3.77	3.77
					1.0 cm [0.4 in]	--	--	--	--	2.68	--	--	--	--	--	2.68	2.68
					3.0 cm [1.2 in]	--	--	--	--	1.39	--	--	--	--	--	1.39	1.39
Addendum 2	B-10	Pre-lay trenching between the Neptune Cable crossing and end of pipeline (2.5% loss)	Clamshell (environmental bucket with scow overflow)	MP35.19 to MP35.49	0.3 cm [0.12 in]	--	1.98	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-11	Dredging of backfill source material from Ambrose Channel (2.5% loss)[c,d]	Clamshell (environmental bucket with scow overflow)	Ambrose Channel (W to E)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-12	Dredging of backfill source material from Rockaway Inlet (2.5% loss)[c,d]	Clamshell (environmental bucket with scow overflow)	Rockaway Inlet (S to N)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-13	Dredging of backfill source material from Earle Channel (2.5% loss)[c]	Clamshell	Earle Channel (W to E)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--

Modeling Report	Modeled Scenario	Construction Activity	Equipment Type	Location	Deposition [minimum average]	NY Shellfish Lands (ac)		NYSDEC Special Harvest Areas (ac)		NJ Shellfish Waters (2016) (ac)		NJDEP 2014 Surfclam Bed (ac)	NJDEP 2014 Hard Clam Beds -Relative Abundance (ac)			NJDEP Sport Ocean Fishing Ground (ac)	Shallow Water (less than 20 feet MLLW)c (ac)
						Uncertified	Certified	Transplant-ation (Hard Clam)	Bait (Surfclam)	Prohibited	Special Restricted		High	Moderate	Low		
			(environmental bucket with scow overflow)														
Addendum 2	B-14	Dredging of backfill source material from Ambrose Channel (0.5% loss)e	Clamshell (environmental bucket with no scow overflow)	Ambrose Channel (W to E)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-15	Dredging of backfill source material from Rockaway Inlet (0.5% loss)e	Clamshell (environmental bucket with no scow overflow)	Rockaway Inlet (S to N)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-16	Dredging of backfill source material from Earle Channel (0.5% loss)e	Clamshell (environmental bucket with no scow overflow)	Earle Channel (W to E)	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-17	Side-cast across the anchorage area (100% loss)e	Clamshell	MP24.00 to MP24.78	0.3 cm [0.12 in]	53.96	--	--	--	--	--	--	--	--	--	--	18.56
					1.0 cm [0.4 in]	36.04	--	--	--	--	--	--	--	--	--	--	13.89
					3.0 cm [1.2 in]	22.87	--	--	--	--	--	--	--	--	--	--	9.63
Addendum 2	B-18	Side-cast at the Ambrose HDD pit (West) (100% loss)e	Clamshell	MP29.52	0.3 cm [0.12 in]	--	--	--	--	18.53	--	--	--	--	--	1.61	--
					1.0 cm [0.4 in]	--	--	--	--	6.44	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	4.36	--	--	--	--	--	--	--
Addendum 2	B-19	Side-cast at the Ambrose HDD pit (East) and Ambrose Channel tie-in (100% loss)e	Clamshell	MP30.40	0.3 cm [0.12 in]	--	--	--	--	6.36	--	--	--	--	--	6.54	6.86
					1.0 cm [0.4 in]	--	--	--	--	4.46	--	--	--	--	--	4.46	4.43
					3.0 cm [1.2 in]	--	--	--	--	3.87	--	--	--	--	--	3.87	3.84
Addendum 2	B-20	Side-cast between the Neptune Cable crossing and RDL (100% loss)e	Clamshell	MP35.19 to MP35.49	0.3 cm [0.12 in]	--	22.77	--	--	--	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	14.95	--	--	--	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	9.90	--	--	--	--	--	--	--	--	--	--
Addendum 2	B-21	Backfilling of trench between Morgan HDD exit and the Midline tie-in	Clamshell	MP12.50-MP16.60	0.3 cm [0.12 in]	166.85	--	163.77	--	114.82	--	--	117.16	--	--	--	281.68
					1.0 cm [0.4 in]	132.66	--	130.27	--	90.86	--	--	92.76	--	--	--	223.52
					3.0 cm [1.2 in]	96.59	--	94.75	--	65.60	--	--	67.08	--	--	--	162.19
Addendum 2	B-22	Backfilling of Ambrose Channel HDD pit (West)	Clamshell	MP29.52	0.3 cm [0.12 in]	--	--	--	--	15.16	--	--	--	--	--	--	--
					1.0 cm [0.4 in]	--	--	--	--	8.92	--	--	--	--	--	--	--
					3.0 cm [1.2 in]	--	--	--	--	5.15	--	--	--	--	--	--	--
Addendum 3	C-1	Clamshell dredge Raritan Channel deep prism (15-ft depth of cover) with no scow overflow	Clamshell	MP 17.23 - MP 17.97	0.3 cm [0.12 in]	--	--	--	--	--	--	--	--	--	--	--	
					1.0 cm [0.4 in]	--	--	--	--	--	--	--	--	--	--	--	
					3.0 cm [1.2 in]	--	--	--	--	--	--	--	--	--	--	--	
Addendum 3	C-2	Clamshell dredge anchorage deep prism (15-ft depth of cover) with no scow overflow	Clamshell	MP 24.00 - MP 24.70	0.3 cm [0.12 in]	9.91	--	--	--	--	--	--	--	--	--	--	4.90
					1.0 cm [0.4 in]	0.00	--	--	--	--	--	--	--	--	--	--	0.00
					3.0 cm [1.2 in]	0.00	--	--	--	--	--	--	--	--	--	--	0.00
Addendum 3	C-3	Clamshell dredge extended Chapel Hill Channel deep prism (15-ft depth of cover) with no scow overflow	Clamshell	MP 24.70 - MP 25.61	0.3 cm [0.12 in]	9.60	--	--	--	--	--	--	--	--	--	--	4.04
					1.0 cm [0.4 in]	0.00	--	--	--	--	--	--	--	--	--	--	0.00
					3.0 cm [1.2 in]	0.00	--	--	--	--	--	--	--	--	--	--	0.00
Addendum 3	C-4		Clamshell		0.3 cm [0.12 in]	24.18	--	--	--	--	--	--	--	--	--	--	11.61

Modeling Report	Modeled Scenario	Construction Activity	Equipment Type	Location	Deposition [minimum average]	NY Shellfish Lands (ac)		NYSDEC Special Harvest Areas (ac)		NJ Shellfish Waters (2016) (ac)		NJDEP 2014 Surfclam Bed (ac)	NJDEP 2014 Hard Clam Beds -Relative Abundance (ac)			NJDEP Sport Ocean Fishing Ground (ac)	Shallow Water (less than 20 feet MLLW)c (ac)
						Uncertified	Certified	Transplant-ation (Hard Clam)	Bait (Surfclam)	Prohibited	Special Restricted		High	Moderate	Low		
		Clamshell dredge anchorage deep prism (15-ft depth of cover) with scow overflow		MP 24.00 - MP 24.70	1.0 cm [0.4 in]	14.77	--	--	--	--	--	--	--	--	--	--	7.20
					3.0 cm [1.2 in]	0.20	--	--	--	--	--	--	--	--	--	--	0.00
Addendum 3	C-5	Backfill Raritan Channel base-case prism (up to 8-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 17.31 - MP 17.89	0.3 cm [0.12 in]	38.93	--	38.93	--	--	--	--	--	--	--	--	38.93
					1.0 cm [0.4 in]	28.84	--	28.84	--	--	--	--	--	--	--	--	28.84
					3.0 cm [1.2 in]	22.75	--	22.75	--	--	--	--	--	--	--	--	22.75
Addendum 3	C-6	Backfill Raritan Channel deep prism (15-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 17.23 - MP 17.97	0.3 cm [0.12 in]	84.98	--	84.98	--	--	--	--	--	--	--	--	84.98
					1.0 cm [0.4 in]	59.65	--	59.65	--	--	--	--	--	--	--	--	59.65
					3.0 cm [1.2 in]	46.28	--	46.28	--	--	--	--	--	--	--	--	46.28
Addendum 3	C-7	Backfill anchorage area base-case prism (7-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 24.00 - MP 24.78	0.3 cm [0.12 in]	55.54	--	--	--	--	--	--	--	--	--	--	20.59
					1.0 cm [0.4 in]	43.56	--	--	--	--	--	--	--	--	--	--	16.66
					3.0 cm [1.2 in]	33.66	--	--	--	--	--	--	--	--	--	--	13.17
Addendum 3	C-8	Backfill anchorage area deep prism (15-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 24.00 - MP 24.70	0.3 cm [0.12 in]	63.56	--	--	--	--	--	--	--	--	--	--	24.16
					1.0 cm [0.4 in]	49.80	--	--	--	--	--	--	--	--	--	--	19.72
					3.0 cm [1.2 in]	39.80	--	--	--	--	--	--	--	--	--	--	16.45
Addendum 3	C-9	Backfill extended Chapel Hill Channel prism (up to 8-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 24.78 - MP 25.61	0.3 cm [0.12 in]	55.26	--	--	--	--	--	--	--	--	--	--	28.41
					1.0 cm [0.4 in]	41.97	--	--	--	--	--	--	--	--	--	--	22.33
					3.0 cm [1.2 in]	31.32	--	--	--	--	--	--	--	--	--	--	15.77
Addendum 3	C-10	Backfill extended Chapel Hill Channel deep prism (15-ft depth of cover) @ 7,500 ft3/hr	Clamshell	MP 24.70 - MP 25.61	0.3 cm [0.12 in]	79.45	--	--	--	--	--	--	--	--	--	--	39.21
					1.0 cm [0.4 in]	57.86	--	--	--	--	--	--	--	--	--	--	29.65
					3.0 cm [1.2 in]	45.86	--	--	--	--	--	--	--	--	--	--	23.59
Addendum 3	C-11	Backfill of trench between Morgan HDD exit and the Midline tie-in @ 4,800 ft3/hr	Clamshell	MP 12.50 - MP 16.60	0.3 cm [0.12 in]	192.20	--	187.73	--	123.55	--	--	126.47	--	--	--	315.76
					1.0 cm [0.4 in]	153.26	--	149.78	--	98.10	--	--	100.44	--	--	--	251.36
					3.0 cm [1.2 in]	112.94	--	110.68	--	70.95	--	--	72.54	--	--	--	183.89
Addendum 3	C-12	Backfill Raritan Channel deep prism (15-ft depth of cover) @ 4,800 ft3/hr	Clamshell	MP 17.23 - MP 17.97	0.3 cm [0.12 in]	83.10	--	83.10	--	--	--	--	--	--	--	--	83.10
					1.0 cm [0.4 in]	59.43	--	59.43	--	--	--	--	--	--	--	--	59.43
					3.0 cm [1.2 in]	46.97	--	46.97	--	--	--	--	--	--	--	--	46.97
Addendum 3	C-13	Backfill of Ambrose HDD Pit (East) and tie-in @ 4,800 ft3/hr	Clamshell	MP 30.40	0.3 cm [0.12 in]	--	--	--	--	16.65	--	--	--	--	--	19.82	17.39
					1.0 cm [0.4 in]	--	--	--	--	12.09	--	--	--	--	--	13.48	12.76

Note: Shaded entries reflect previously modeled sediment modeling scenarios that are no longer under consideration and, therefore, are not considered as part of total impact area calculations.

Notes:

[a] Any differences between acreages in this table and those presented in the sediment modeling results are a result of rounding and differences in mapping projection.

[b] Potential areas of impact for scenarios do not include areas of deposition within the bounds of navigational channels, as these areas are considered to be regularly disturbed.

[c] Shallow water estuarine areas crossed by the offshore Project route serve as winter flounder spawning habitat.

[d] Sediment modeling scenarios with 2.5% loss were considered as part of total impact area calculations as the results meet anticipated compliance monitoring requirements and provide conservative estimates of potential areas of impact.

[e] A 100% sediment loss value corresponds to the assumption that all the material is released into the water column at a height of approximately 5 feet above the ambient seafloor elevation. This assumption applies to the use of either an environmental bucket or conventional bucket.

Key:

-- = No affected area
ac = acres
cm = centimeter
ft = feet
ft3/hr = cubic feet per hour
HDD = horizontal directional drill
in = inch
MLLW = mean lower low water
MP = Milepost
NJDEP = New Jersey Department of Environmental Protection
NYSDEC = New York State Department of Environmental Conservation
RDL = Rockaway Delivery Lateral

Backfill-related modeling results are based on conservative (i.e., overestimated) but realistic assumptions, including the following:

- Continuous operation will occur for each scenario.
- The clamshell dredge loss rate will be 5% of total dredge volume, with 4% of the dredge volume released at the sea surface (representing scow overflow) and the remaining 1% of the dredge volume distributed equally throughout the water column (representing loss from the bucket as it is raised and lowered during the dredging cycle).
- The total volume of sediment to be dredged is the sum of all areas requiring backfill, with additional volume to account for losses during dredging (5%) and an "overfill" factor for material that may be dispersed or off target during backfill placement (20%). This overfill factor is based on Transco's real-world experience with backfill material transfer efficiency.
- No infill due to natural sedimentation or use of potentially side-cast material is considered.
- All backfill material will be released from a depth that is 5 feet above the ambient seafloor elevation.
- The grain size distribution for the backfilling activities is an average of all potential backfill source channel areas.

Transco notes that the assumption of 5% clamshell dredge loss rate is less than the 10% loss rate assumption for the base case scenarios but still represents a conservative value. In comparison, average loss (i.e., resuspension factor) for a conventional clamshell dredge bucket has been reported to be approximately 1%, not considering barge overflow (Palermo et al. 2008). Another study indicates that the total average loss of sediment during clamshell dredging in New York Harbor is approximately 2%, including scow overflow (Tavolaro 1984). Other studies also support the application of resuspension values of 5% or less for clamshell dredging, with and without scow overflow (e.g., Hayes and Wu 2001).

Areas to be installed using the jet trencher were not included in the backfill scenarios because at least 95% of the disturbed material is expected to remain within the trench during pipeline lowering. Therefore, Transco does not expect backfill to be necessary because the jet-trenched areas will effectively match surrounding seafloor elevations when pipeline installation is complete. However, the conditions will be confirmed during a post-installation survey, and backfill will be placed in jet-trenched areas, if warranted, in accordance with all applicable permit conditions.

For any supplemental offshore backfill activities, selected material will be predominantly sandy material and have only a limited amount of silt and clay, which will help ensure stability and minimize deposition outside of the target backfill area. As discussed previously, the backfill material will be compatible with existing sediment but may have a substantially lower amount of fine-grained material (i.e., silt and clay) than some of the sites along the Raritan Bay Loop route. During supplemental backfilling activities, the clamshell bucket will be lowered below the water surface before release to help reduce loss of backfill.

Transco also evaluated whether a "tremie" tube would be an effective backfill tool to help reduce turbidity. Based on contractor feedback the effects of using tremie technology for backfilling activities would be similar to or greater than using a clamshell dredge. For instance, the use of the tremie tube is expected to generate a larger suspended sediment plume than the use of a clamshell dredge for similar backfilling rates. This is mainly because a tremie tube would likely be fixed to a barge in a manner that releases material at a height of more than 5 feet above the seafloor in order to prevent the tube from impacting the seafloor given highly variable wave and tide conditions in the offshore environment. In comparison, a clamshell dredge can release sediment at a height of 5 feet or less above the seafloor as a best management practice. Backfilling "production" rates would likely be slower using a tremie tube, i.e., roughly half the rate of using a clamshell dredge due to anticipated inefficiencies in the tremie conveyer system. A slower rate would likely reduce the extent of a suspended sediment plume, but a clamshell dredge backfilling rate can also be reduced, as warranted, to limit the concentrations of suspended sediments. The hydrodynamic sediment modeling for the backfilling activities with a clamshell bucket used the assumption that backfill material would be released at a fixed height of approximately 5 feet above the seafloor. The modeling effort also considered slower backfilling rates to control the extent of the suspended sediment plume to meet anticipated compliance monitoring criteria. Therefore, Transco does

not plan to perform additional sediment modeling specifically for backfilling with the tremie technique because the existing model results present an approximate representation of suspended sediment plumes that would be generated using a tremie tube at similar "production" rates. Further, use of a tremie tube is not currently proposed due to the rate limitations, but Transco continues to explore the feasibility of using tremie technology for backfilling as a supplement to the clamshell dredge, considering factors like tremie equipment availability.

The sediment modeling results of the extent of suspended sediment plumes and sedimentation for each backfill-related scenario are provided in **Table 16**, above. As with the modeling effort for "base case" scenarios, reported sediment concentrations are above ambient concentrations in the Project area. Concentrations were calculated with a horizontal grid resolution of 20 by 20 meters and a vertical grid resolution of 0.5 meter.

9.3.5 Suspended Sediment Summary (Addendum 1 Modeling)

The predicted sediment plumes and TSS concentrations for backfill-related activities also varied in magnitude and scale along the entire offshore route (see **Table 16**, above). Sediment modeling results of clamshell dredge activities in the channel areas to be used as a source of backfill indicated that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 2,526 and 6,365 feet from the source, and TSS concentrations would return to ambient conditions within 0.6 to 1.0 hour after the associated dredging has ceased. Sediment modeling results of backfilling activities indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 886 and 2,444 feet from the source, and TSS concentrations would return to ambient conditions within 1.5 to 3.5 hours.

Actual TSS concentrations during construction may be less than modeled concentrations based on the conservative modeling assumptions used, some of which are discussed above. In addition, the bathymetry used for the modeling does not account for the dimensions of the trench or pit that is being backfilled. The actual morphology of the dredged and excavated areas will potentially allow the clamshell bucket to be lowered deeper in the water column before releasing material, and the side slopes of the dredged and excavated areas will substantially reduce the lateral dispersion of the placed material.

9.3.6 Sediment Deposition Results (Addendum 1 Modeling)

Predicted sediment deposition for backfill-related scenarios varied in magnitude along the entire offshore route. The sediment modeling results indicate that sedimentation greater than 3 cm (1.2 inches) resulting from clamshell dredging to obtain backfill material (Scenarios A-1 through A-3) would range from 0 to 72 feet from the source and would cover between 0.0 and 7.2 acres, depending on the scenario. The sediment modeling results indicate that sedimentation greater than 3 cm (1.2 inches) resulting from backfilling activities (Scenarios A-4 through A-13) would range between 197 and 525 feet from the source and would cover between 1.6 and 158.7 acres, depending on the scenario.

"Sedimentation" includes the full quantity of material that is placed as backfill, and therefore deposition levels are often predicted to be several feet thick in the central grid cells that encompass the width of the excavated areas. Because all placement is assumed to be on target along the center of the placement areas, maximum deposition levels for certain backfill scenarios exceed the depth of the area to be backfilled; this indicates that not as much "overfill" material may be required if all placement is on target.

9.3.7 Summary of Addendum 2 Modeling Results

In consideration of the modeling results described above, Transco has explored advancements in technology and associated BMPs that would enable Transco to further control and reduce Project-generated TSS (and turbidity). For example, Transco modeled replacing the conventional clamshell dredge bucket with an environmental clamshell dredge bucket and/or a jet trencher, where feasible, to limit sediment losses to the water column and determine which tool would best limit elevated levels of TSS within the water column along certain portions of the route. Therefore, Transco conducted additional sediment modeling to simulate the use of an environmental bucket for all clamshell dredging scenarios, as well as the use of a jet trencher along a distinct portion of the route (MP12.5 to MP16.6). The additional

environmental bucket scenarios were evaluated with and without the assumption of scow barge (scow) overflow at the surface; scow overflow is associated with sediment dewatering, which allows for more efficient dredging (e.g., shorter duration) but increases TSS in the water column.

Transco has conducted additional modeling in Addendum 2 to re-evaluate certain clamshell dredging scenarios to include the temporary placement of clamshell-dredged sediments adjacent to the dredged area (i.e., side-casting) for subsequent use as backfill. Side-casting was only considered in areas deeper than -15 feet MLLW (but was subsequently eliminated from consideration). Certain backfill scenarios were also remodeled assuming a reduced constant production rate. The following is a summary of the new modeling results. Note that Transco is not proposing to side-cast clamshell-dredged material.

The additional modeling included 22 distinct modeling scenario (**Figures 50 through 88** depict the scenarios **(see Additional Figures)**, which were generally divided into four types of construction activities associated with different stages of the offshore installation for discrete sections of the offshore environment between MP12.50 and MP35.49, as follows:

- Clamshell dredging with an environmental bucket where sediment is lost both as the bucket ascends through the water column and due to overflow of the scow at the sea surface (2.5% sediment loss rate[16]) (Scenarios B-1, B-7, and B-9 through B-13);
- Clamshell dredging with an environmental bucket where sediment is only lost as the bucket ascends through the water column (0.5% sediment loss rate). No overflow of the scow occurs (Scenarios B-2, B-4, B-5, B-6, B-8, B-14, B-15, and B-16);
- Post-lay trenching (by jet trencher) to achieve pipeline burial (5% sediment loss rate) (Scenario B-3);
- Clamshell dredging and subsequent side-casting of dredged materials to the seabed at four locations along the pipeline route (100% sediment loss rate[17]) (Scenarios B-17 through B-20) (note that Transco is not proposing to side-cast clamshell-dredged material); and
- Placement of backfill materials (100% sediment loss rate[2]) for two segments of the route excavated using a clamshell dredge (Scenarios B-21 and B-22).

The locations of these scenarios are generally shown on **Figure 50** (see **Additional Figures**). **Table 17** presents the sediment modeling results of suspended sediment plumes and sedimentation for each modeled scenario. Reported TSS concentrations are expressed as the incremental increase above ambient concentrations in the Project area. Concentrations were calculated with a horizontal grid resolution of 20 by 20 meters and a vertical grid resolution of 0.5 meter. Modeling results are based on conservative (i.e., overestimated) but realistic assumptions, including the following:

- Continuous operation will occur for each scenario.
- Excavated volumes for certain Addendum 2 scenarios have been reduced from the corresponding base-case scenarios to account for revisions to the design of some pre-lay, clamshell dredge trenches to account for refined slope estimates (refinement from 4H:1V to 3H:1V). This revision is based on analysis of the geotechnical data for sediment samples collected along the proposed route, which indicates that the steeper slope is more realistic.
- All side-cast material will be released from a depth that is 5 feet above the ambient seafloor elevation.

[16] "Sediment loss rate" in this context means the percentage of total volume of sediment that is released into the water column during the specified activity, referred to as a "resuspension factor" in other literature (e.g., Palermo et al. 2008). The release rate (sediment volume per unit time) for a given scenario is the rate of dredging/trenching/backfilling multiplied by the sediment loss rate.

[17] For Addendum 2 scenarios, a 100% sediment loss rate corresponds to the assumption that all the material is released into the water column at a height of approximately 5 feet above the ambient seafloor elevation. This assumption applies to the use of either an environmental bucket or conventional bucket.

- No infill due to natural sedimentation or use of potentially side-cast material is considered. However, "sedimentation" results include the full quantity of material that is side-cast and, therefore, deposition levels are often predicted to be several feet thick in the central grid cells that encompass the width of the excavated areas.
- The total volume of sediment to be dredged from the three backfill source channel is the sum of all areas requiring backfill, with additional volume to account for losses during dredging (5%) and an "overfill" factor for material that may be dispersed or off target during backfill placement (20%). This overfill factor is based on Transco's real-world experience with backfill material transfer efficiency. The volume to be dredged from each proposed backfill source channel area was assumed to be a third of the total backfill volume.

Transco notes that the assumptions of 2.5% and 0.5% clamshell dredge loss rates used in Addendum 2 scenarios are based on the use of an environmental bucket with and without overflow, respectively. These values are less than the loss rate assumptions for clamshell dredging with a conventional bucket presented in the base-case and Addendum 1 scenarios. However, a 0.5% average loss rate (i.e., resuspension factor) is still considered a conservative (i.e., upper-level) estimate for mechanical dredges with environmental buckets, not considering scow overflow (Palermo et al. 2008; Schroeder n.d.). Another study indicates that the total average loss of sediment during clamshell dredging in New York Harbor was approximately 2%, including scow overflow (Tavolaro 1984). Other studies also support the application of resuspension values of less than 2.5% for clamshell dredging with scow overflow (e.g., Hayes and Wu 2001).

Note that as part of this permit application, Transco is proposing to acquire backfill material from one or more existing commercial vendors.

The full summary of the results is presented in the Addendum 2 modeling report (see **Appendix L-3**).

9.3.8 Suspended Sediment Summary (Addendum 2 Modeling)

The predicted sediment plumes and TSS concentrations for backfill-related activities vary in magnitude and scale along portions of the offshore route. The additional modeling scenarios were developed to estimate plume dispersion associated with previously modeled clamshell dredging scenarios using alternate construction methods, i.e., (i) clamshell dredging using an environmental bucket with overflow of scow, (ii) clamshell dredging using an environmental bucket without overflow of scow, (iii) jet trenching, (iv) clamshell dredging with side-casting, and/or (v) reduced rate of backfill (see **Table 16**, above). The results of the additional modeling are summarized in the Addendum 2 modeling report (**Appendix L-3**) and **Table 16**.

- Sediment modeling results of environmental clamshell dredging with scow overflow for pre-lay trenching and HDD pit excavation activities indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 0 and 591 feet from the source, and TSS concentrations would return to ambient conditions within 0.6 to 1.7 hours after the associated dredging has ceased.
- Sediment modeling results of environmental clamshell dredging with no scow overflow for trenching and HDD pit excavation activities indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 0 and 148 feet from the source, and TSS concentrations would return to ambient conditions within 0 to 0.5 hour after the associated dredging has ceased.
- Sediment modeling results of a single jet trenching activity indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend 1,476 feet from the source, and TSS concentrations would return to ambient conditions within 0.2 hour.
- Sediment modeling results of environmental clamshell dredging with scow overflow in the channel areas to be used as a source of backfill indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 1,033 and 2,116 feet from the source, and TSS concentrations would return to ambient conditions within 0.2 to 1.0 hour after the associated dredging has ceased.

- Sediment modeling results of environmental clamshell dredging with no scow overflow in the channel areas to be used as a source of backfill indicate that there will be no sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L, and TSS concentrations would return to ambient conditions within 0 to 0.5 hour after the associated dredging has ceased.
- Sediment modeling results of clamshell dredging with side-casting activities indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L could extend between 1,296 and 17,684 feet from the source, and TSS concentrations would return to ambient conditions within 0.9 to 7.3 hours.
- Sediment modeling results of backfill activities with a reduced rate of backfill indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L could extend between 1,329 and 1,526 feet from the source, and TSS concentrations would return to ambient conditions within 1.2 to 1.3 hours.

Actual TSS concentrations during construction may be less than modeled concentrations based on the use of somewhat conservative modeling assumptions, some of which are discussed above. Based on the extensive plume results for Scenario B-18 and B-19, and logistical challenges that would increase the duration of in water work, Transco does not propose side-casting when dredging the Ambrose Channel HDD pits; that material will be disposed of in accordance with its approved dredged material management plan.

Side-casting across the anchorage area (Scenario B-17) (entirely in New York waters) is no longer being considered and Transco will dispose of the dredged material at the HARS or at an upland disposal facility.

Modeling indicates that clamshell dredging with scow overflow will not generate extensive plumes. Therefore, Transco proposes scow dewatering following a suitable settling period in these areas to increase dredging efficiency, which will shorten the duration of dredging.

9.3.9 Sediment Deposition Results (Addendum 2 Modeling)

Sediment deposition results for the Addendum 2 scenarios include both Project-related sedimentation and, in the case of side-casting, direct in-water placement of dredged material. The level of deposition predicted for the Addendum 2 scenarios varies in magnitude along the offshore route and depends on factors such as equipment type, total volume dredged, and sediment characteristics. **Table 16** presents the range of deposition that may occur for each scenario in terms of three representative levels of sedimentation, which may cause varying degrees of adverse effects on benthic and demersal species and life-stages. **Figures 36 through 57** (see **Additional Figures**) depict the extent of the modeled deposition for each Addendum 2 scenario with respect to several offshore resources. **Table 17**, above, provides numerical estimates of the resource areas that may be covered by Project-related sedimentation for Addendum 2 scenarios ranging from at least 0.3 cm (0.12 inch) to at least 3 cm (1.2 inches). Sediment modeling results of environmental clamshell dredging with scow overflow for pre-lay trenching and HDD pit excavation activities indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 371 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 187 feet from the source.

- Sediment modeling results of environmental clamshell dredging with no scow overflow for trenching and HDD pit excavation activities indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 148 feet from the source. No deposition is predicted to exceed 3.0 cm (1.2 inch) for these scenarios.
- Sediment modeling results of a single jet trenching activity indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 97 feet from the source. No deposition is predicted to exceed 3.0 cm (1.2 inches) for this scenario (excluding the sediment that remains within the trench).
- Sediment modeling results of environmental clamshell dredging with scow overflow in the channel areas to be used as a source of backfill indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 299 feet from the source. No deposition is predicted to exceed 3.0 cm (1.2 inches) for these scenarios.

- Sediment modeling results of environmental clamshell dredging with no scow overflow in the channel areas to be used as a source of backfill indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 79 feet from the source. No deposition is predicted to exceed 3.0 cm (1.2 inches) for these scenarios.
- Sediment modeling results of clamshell dredging with side-casting activities indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 1,198 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 397 feet from the source.
- Sediment modeling results of backfill activities with a reduced rate of backfill indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 453 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 282 feet from the source.

For a full discussion of modeling results and model output figures, see the Addendum 2 modeling report in **Appendix L-3**.

9.3.10 Summary of Addendum 3 Modeling Results

Based on USACE New York District (NYD) feedback in May 2018 regarding cover depth requirements, Transco conducted additional modeling to simulate sediment losses from deeper dredging and burial (15 feet of sediment cover) of the pipeline at the Raritan Bay Channel and Chapel Hill Channel crossings and adjacent anchorage area, all in New York waters. Transco also simulated sediment losses from backfilling sections of the pipeline trench at slower rates (7,500 cubic feet per hour [ft^3/hr] and/or 4,800 ft^3/hr) compared to corresponding previously modeled scenarios, some in New Jersey waters; this was done to evaluate whether implementing reasonably slower backfilling rates in the respective areas could effectively reduce resultant suspended sediment plumes to meet anticipated compliance monitoring criteria.

The following is a summary of the modeling results reported in Addendum 3 (**Appendix L-4**).

The additional modeling included 13 distinct modeling scenario (**Figures 89 through 105** depict the scenarios **(see Additional Figures)**,, which were divided into three categories based on three types of construction activities associated with different stages of the offshore installation for discrete sections of the offshore environment between MP12.50 and MP35.49, as follows:

- Clamshell dredging with an environmental bucket where sediment is lost as the bucket ascends through the water column (0.5% sediment loss). No overflow of the scow barge is permitted. (Scenarios C-1, C-2, and C-3)
- Clamshell dredging with an environmental bucket where sediment is lost as the bucket ascends through the water column and from overflow of the scow barge at the sea surface (2.5% sediment loss). (Scenario C-4)
- Simulations of placement of backfill materials in segments of the pipeline route previously excavated using clamshell dredges (100% sediment loss). (Scenarios C-5 through C-13)

The general locations of these scenarios are shown on **Figure 89** (see **Additional Figures**). Table 2 in Addendum 3 (**Appendix L-4**) presents the sediment modeling results of suspended sediment plumes and sedimentation for each modeled scenario. Reported total suspended solids (TSS) concentrations are expressed as the incremental increase above ambient concentrations in the Project area. Concentrations were calculated with a horizontal grid resolution of 20 meters by 20 meters and a vertical grid resolution of 0.5 meter. Modeling results are based on conservative (i.e., overestimated) but realistic assumptions, including the following:

- Continuous operation would occur for each scenario.
- Dredging scenarios were modeled with a constant dredge production rate of 11,250 ft^3/hr.
- No infill due to natural sedimentation or use of potentially side-cast material is considered. However, "sedimentation" results include the full quantity of material that is backfilled; therefore, deposition levels are often predicted to be several feet thick in the central grid cells that encompass the width of the excavated areas.

- The total volume of sediment to be backfilled includes an "overfill" factor for material that may be dispersed or off target during backfill placement (20%). This overfill factor is based on Transco's real-world experience with backfill material transfer efficiency.
- 2.5% and 0.5% clamshell dredge loss rates were applied for the use of an environmental bucket with and without overflow, respectively.

The full summary of the results is presented in the Addendum 3 modeling report (**Appendix L-4**).

9.3.11 SUSPENDED SEDIMENT SUMMARY (ADDENDUM 3 MODELING)

The predicted sediment plumes and TSS concentrations for backfill-related activities vary in magnitude and scale along portions of the offshore route. The additional modeling scenarios were developed to estimate plume dispersion associated with (i) previously modeled clamshell dredging scenarios assuming deeper cover depth requirements (i.e., minimum 15 feet of sediment cover) at the channel crossings and adjacent anchorage area and (ii) backfilling sections of the pipeline trench at slower rates compared to corresponding previously modeled scenarios. The results of the additional modeling are summarized in Table 2 of the Addendum 3 modeling report (**Appendix L-4**).

- Sediment modeling results of environmental clamshell dredging with no scow overflow for pre-lay trenching in the channels and anchorage area indicate there would be no sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L, and TSS concentrations would return to ambient conditions within 0 to 0.3 hour after the associated dredging has ceased.
- Sediment modeling results of environmental clamshell dredging with scow overflow for trenching activities across the anchorage area indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend 197 feet from the source, and TSS concentrations would return to ambient conditions within 0.5 hour after the associated dredging has ceased.
- Sediment modeling results of backfill activities with a reduced backfilling rate of 7,500 ft^3/hr indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L would extend between 919 and 1,247 feet from the source, and TSS concentrations would return to ambient conditions within 1.0 to 1.8 hours.
- Sediment modeling results of backfill activities with a further reduced backfilling rate of 4,800 ft^3/hr 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 1.1 hours.

Actual TSS concentrations during construction may be less than modeled concentrations based on the use of conservative modeling assumptions, some of which are discussed above. In general, these results indicate that Transco will be able to meet TSS and turbidity standards and requirements at the proposed compliance monitoring locations, which are expected to range up to 1,500 feet, depending on factors such as the characteristics of sediment to be dredged and the resources in a given area. The main exception is the modeled scenario for backfilling of the Ambrose HDD pit (east). At this location, a slower backfilling rate of 4,800 ft^3/hr resulted in a larger maximum plume extent compared to the original rate of 11,250 ft^3/hr. This is likely because the longer model duration (i.e., longer period of backfilling resulting from reduced backfilling rates) expose the modeled activity to a greater range of metocean conditions in an area subject to high current velocities. However, statistical analysis indicates that 99% of the time concentrations of 50 mg/L are not expected to extend more than 1,300 feet from the Ambrose HDD pit (east) during backfilling at 4,800 ft^3/hr.

9.3.12 SEDIMENT DEPOSITION RESULTS (ADDENDUM 3 MODELING)

The level of deposition predicted for the Addendum 3 scenarios varies in magnitude along the offshore route and depends on factors such as backfilling rate, total volume dredged, and sediment characteristics. Representative deposition results for all the Addendum 3 scenarios are presented in Table 2 of the Addendum 3 modeling report (**Appendix L-4**), and are summarized as follows:

- Sediment modeling results of environmental clamshell dredging with no scow overflow for trenching activities in the channels and anchorage area indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 85 feet from the source. No deposition is predicted to exceed 3.0 cm (1.2 inches) for these scenarios.
- Sediment modeling results of environmental clamshell dredging with scow overflow for trenching activities in the anchorage area indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 174 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 13 feet from the source.
- Sediment modeling results for backfilling activities with a reduced backfilling rate of 7,500 ft^3/hr indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 981 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 643 feet from the source.
- Sediment modeling results for backfilling activities with a further reduced backfilling rate of 4,800 ft^3/hr indicate that deposition exceeding 0.3 cm (0.12 inch) may extend up to 945 feet from the source, while deposition exceeding 3.0 cm (1.2 inches) may extend up to 574 feet from the source.

For a full discussion of modeling results and model output figures, see the Addendum 3 modeling report in **Appendix L-4.** See also **Figures 59 through 71 in Additional Figures**, which depict the extent of the modeled deposition for each Addendum 3 scenario with respect to several offshore resources.

9.3.13 SEDIMENT MODELING CONCLUSION

In general, the Project-specific hydrodynamic and sediment transport modeling results indicate that Transco will be able to meet New Jersey's SWQs for turbidity within 500 of clamshell dredging and within 2,500 feet of other Project construction activities, depending on site-specific factors such as current velocities, construction method, production rate, and material characteristics. It also accounts for a typical minimum safe operating distance of 500 feet for clamshell dredging. This considers a TSS concentration of 50 mg/L, which, as discussed above, is expected to correlate with turbidity levels between 10 to 30 NTUs (i.e., the SWQs for Class SC and SE1 waters, respectively). Transco will adhere to an NJDEP-approved water quality monitoring plan that incorporates adaptive management strategies during Project construction to help ensure compliance with New Jersey SWQSs described at N.J.A.C. 7:9B. Transco's Draft Water Quality Monitoring Plan for New Jersey Waters is provided as **Appendix M**.

10.0 CONTAMINANT TRANSPORT MODELING

As part of a 2018 project-specific geotechnical and geochemical site investigation, vibracore samples were collected from 69 sites along the Raritan Bay Loop route. At six of these sites in NJ waters, seven contaminants (bis[2-ethylhexyl]phthalate, phenanthrene, arsenic, manganese, mercury, polychlorinated biphenyls [PCBs], and 4,4'-DDE) were detected in the sediments at concentrations exceeding Ecological Saline Water Sediment Effects Range Median (ER-M) screening criteria, as identified in NJDEP's Notice of Denial (dated June 5, 2019). Transco conducted modeling of these contaminant parameters to provide additional assurance that proposed Project BMPs will be sufficient to prevent exceedances of available surface SWQSs for the identified contaminants (see N.J.A.C. 7:7-16.3 of the **Compliance Statement** for further discussion of proposed BMPs). A full summary of the results is presented in the Contaminant Transport Modeling Report (**Appendix L-5**).

Subsequently, in October 2026, Transco conducted additional modeling for 4,4'-DDE based on the 2018 contaminant data for two of the above-referenced sites. These additional scenarios considered a constant production rate of 4,800 cf/hr and a 1-hour pause in dredging during each slack-tide period.

The water quality criteria for the modeled contaminants can be found in the N.J.A.C. 7:9B Surface Water Quality Standards. The N.J.A.C. 7:9B acute and chronic criteria for saline waters are presented in **Table 18** along with the EPA National recommended Water Quality Criteria for Aquatic Life (EPA n.d.) for comparison. As shown in **Table 18**, there are chronic criteria for PCBs, and both chronic and acute criteria for arsenic and mercury. There do not appear to be any promulgated acute or chronic criteria for bis(2-ethylhexyl)phthalate, phenanthrene, manganese, or 4,4'-DDE.

Human health-based criteria are presented in N.J.A.C. 7:9B for some of the elevated contaminants identified in the Project area, such as 4,4'-DDE and manganese. Such criteria have been established in saline waters due to consumption of fish (N.J.A.C. 7:9B-1.5(a)5). More specifically, the criteria are intended to prevent "toxic substances in waters of the State that bioaccumulate in the aquatic biota so as to render them unfit for human consumption" (N.J.A.C. 7:9B-1.5(a)4). However, the Project area with elevated contaminants is in a portion of Raritan Bay that is on the Section 303(d) list of impaired waters and is classified as prohibited for shellfish harvesting (See N.J.A.C. 7.7-9.2 of the **Compliance Statement** for further discussion of shellfish habitat). Furthermore, primary contact activities such as wading, swimming, diving, surfing, and water skiing will not occur in or near the offshore work areas during active construction given the distance of work areas at least 1,000 feet from shore and the measures Transco will take to direct marine users away from the active work areas. Lastly, dredging in the area with the highest concentrations of contaminants such as PCB and 4,4-DDE (i.e., between MP 12.5 and MP 12.75) would take only approximately 7 days to complete and, as noted in Section 9.3, suspended sediments are anticipated to return to ambient conditions in this area within 30 minutes after dredging ceases. Therefore, any Project-related elevation of contaminant concentrations in the water column during this brief period is not expected to result in impacts to human health, including significant bioaccumulation of contaminants in the tissue of fish that may pass through the area during the dredging activity (See N.J.A.C 7:7-16.3 and **Appendix L** of the **Compliance Statement** for further discussion of Project effects on water quality and risks to ecological receptors). Accordingly, the human health criteria are not relevant to the evaluation of Project impacts and are not considered further in this document.

TABLE 18. SELECT WATER QUALITY STANDARDS/CRITERIA FOR SALINE WATERS

Analyte	N.J.A.C. 7:9B Acute (µg/L)	N.J.A.C. 7:9B Chronic (µg/L)	EPA Acute (µg/L)	EPA Chronic (µg/L)
Bis(2-Ethylhexyl)phthalate	None	None	None	None
Phenanthrene	None	None	None	None
Arsenic	69 (Dissolved)	36 (Dissolved)	69 (Dissolved)	36 (Dissolved)
Mercury	1.8 (Dissolved)	0.94 (Dissolved)	1.8 (Dissolved)	0.94 (Dissolved)
PCBs	None	0.03	None	0.03
4,4' DDE	None	None	None	None
Manganese	None	None	None	None

The fate and transport of each contaminant was evaluated at each reach individually, generating a matrix of 14 scenarios, outlined in **Table 19**. Transco evaluated the concentrations of these contaminants at 500 feet from the dredging activity in comparison to acute and chronic SWQSs in N.J.A.C. 7:9B. This 500-foot contaminant modeling distance was considered appropriate based on sediment modeling results for clamshell dredging scenarios, i.e., the clamshell dredging activities are predicted to generate TSS concentrations more than 50 mg/L above ambient conditions up to 443 feet from dredging locations. This also accounts for a typical minimum safe operating distance of approximately 500 feet for monitoring near clamshell dredging operations.

The resuspension of contaminants during all modeling scenarios was evaluated assuming the use of a clamshell dredge with an environmental bucket and no barge scow overflow. For all contaminant scenarios, the initial dredge advance rate was calculated based on an estimated production rate of 7,500 ft^3/hr. Sediment losses from the clamshell dredge were assumed to be 0.5% of the total dredge volume for excavation activities, distributed evenly throughout the water column in five vertical layers.

TABLE 19. SUMMARY OF ER-M SEDIMENT CONTAMINANT MODELING RESULTS

Scenario Name	Vibracore Site	Contaminant	Equipment Type	Trenching Activity Duration (hrs)	Model predicted maximum concentration at 500 ft (ug/L)[1]	N.J.A.C. 7:9B Acute Criteria Exceedance Results at 500 ft (hrs)[1]	N.J.A.C. 7:9B Chronic Criteria Exceedance Results at 500 ft (hrs)[1]
VC208_Hg_NJ	VC208	Mercury	Clamshell	13.89	0.06	0	0
VC208_As_NJ	VC208	Arsenic	Clamshell	13.89	2	0	0
VC208_PCB_NJ	VC208	PCB Aroclors	Clamshell	13.89	0.018[2]	-	0[2]
VC208_44DDE_NJ	VC208	4,4'-DDE[4]	Clamshell	13.89	0.0009	-	-
VC214_Hg_NJ	VC214	Mercury	Clamshell	15.43	0.17	0	0
VC214_As_NJ	VC214	Arsenic	Clamshell	15.43	5	0	0
VC214_PCB_NJ	VC214	PCB Aroclors	Clamshell	15.43	0.026[2,3]	-	0[2,3]
VC214_PHEN_NJ	VC214	Phenanthrene	Clamshell	15.43	0.16	-	-
VC214_BIS_NJ	VC214	Bis(2-ethylhexyl) phthalate	Clamshell	15.43	0.331	-	-
VC214_44DDE_NJ	VC214	4,4'-DDE[4]	Clamshell	15.43	0.0013	-	-
VC304_Mn_NJ	VC304	Manganese	Clamshell	29.32	20	-	-
DEP3_Mn_NJ	DEP3	Manganese	Clamshell	27.77	13	-	-
DEP4R_Mn_NJ	DEP4R	Manganese	Clamshell	43.20	11	-	-
DEP5R_Mn_NJ	DEP5R	Manganese	Clamshell	40.12	14	-	-

Key:
- = Contaminant does not have promulgated acute or chronic criteria in N.J.A.C. 7:9B.

Notes:
[1] Unless otherwise noted, contaminant transport scenario results reported above used a constant production rate of 7,500 cf/hr.
[2] The PCB contaminant transport scenario results reported above used a constant production rate of 4,800 cf/hr.
[3] The PCB transport scenario for the VC21 segment also used a 1-hour pause in dredging during each slack-tide period (i.e., either side of high tide and low tide) intervals).
[4] The 4,4'-DDE contaminant transport scenario results reported above used a constant production rate of 4,800 cf/hr and a 1-hour pause in dredging during each slack-tide period.

The final results from this analysis are presented in **Table 19** as maximum contaminant concentration (throughout the water column) predicted over the duration of the model run, at a 500-foot radius from the dredging activity at any given time. These model-predicted concentrations at 500 feet were then compared to the corresponding NJDEP acute and chronic water quality criteria, if available (**Table 18**). If an exceedance of the criteria was predicted at the initial dredging rate, the scenario was re-run at a slower average rate until 100% compliance was achieved, as further discussed below.

10.1 Mercury and Arsenic

Based on the modeling results for the four scenarios involving mercury or arsenic, none of the predicted concentrations at a distance of 500 feet from the dredge location exceeded the acute or chronic criteria at N.J.A.C. 7:9B. Based on these contaminant modeling results, Transco expects that there will be no exceedances of the chronic or acute criteria for mercury or arsenic during dredging activities using an environmental bucket with no scow overflow. .

10.2 PCB Aroclors

When initially modeled using the 7,500 cf/hr production rate, PCB Aroclor concentrations were found in exceedance of the chronic criteria for brief durations for both the VC208 and VC214 segments. To address these potential exceedance predictions, the model was rerun using reduced clamshell dredging rates and/or a "slack-tide pause". For VC208 reducing the dredging rate to 4,800 cubic feet per hour (cf/hr) eliminated all potential exceedances of the PCB Aroclor criteria. Although reducing the dredging rate for VC214 alone did not eliminate all potential exceedances of the mercury criterion, 100% compliance is predicted for this segment when the trenching rate is reduced to 4,800 cf/hr and a 1-hour pause in dredging during each slack-tide period (i.e., either side of high tide and low tide intervals) is incorporated in the construction plan. The slack-tide pause was considered because earlier model results performed for construction in New York waters indicated that the greatest potential for exceedances most often occurred shortly after suspended sediment "pooled" in the dredging area during slack-tide periods, and the accumulated sediment was subsequently carried down-current once the ebb and flood tidal currents increased.

Based on these contaminant modeling results, Transco expects that there will be no exceedances of the PCB Aroclor chronic criteria at N.J.A.C. 7:9B during dredging activities using an environmental bucket with no scow overflow using reductions in dredging rates (e.g., 4,800 cf/hr) and/or applying a 1-hour slack-tide pause. .

10.3 Bis(2-ethylhexyl)phthalate, Phenanthrene, Manganese, and 4,4'-DDE

There does not appear to be acute or chronic SWQS promulgated in N.J.A.C. 7:9B or presented as part of the EPA National Recommended Water Quality Criteria for Aquatic Life for bis(2-ethylhexyl)phthalate, phenanthrene, manganese, or 4,4'-DDE. Nonetheless, modeling results indicate that maximum concentrations for all contaminants of concern are reduced when the average dredging rate is slowed. Therefore, construction BMPs and dredging rates implemented to control dispersion of other contaminants noted above will similarly control dispersion of bis(2-ethylhexyl)phthalate, phenanthrene, manganese, and 4,4'-DDE.

10.4 Contaminant Modeling Conclusion

In summary, Project-specific modeling indicates that Transco can comply with acute and chronic SWQSs (for the above mentioned contaminants) promulgated in N.J.A.C. 7:9B within 500 feet of dredging activities. These modeling results, coupled with the BMPs Transco has committed to implement, support a conclusion that there will be no adverse ecological impacts or impacts to water quality due to resuspension of contaminants. In addition, any contaminants that are introduced into the water column will be localized, temporary, and of short duration. Further, Transco will implement a water quality monitoring program that incorporates adaptive management strategies during Project construction to help ensure compliance with relevant New Jersey SWQSs described at N.J.A.C. 7:9B. Transco's Draft Water Quality Monitoring Plan for New Jersey Waters is provided as **Appendix M**.

PART IV. IMPACTS AND MITIGATION

1.0 PROPOSED WETLAND IMPACTS

Following extensive efforts to first avoid and then minimize impacts to regulated features, the proposed Project will result in permanent and temporary impacts to freshwater wetlands and waters, freshwater wetland transition areas, coastal wetlands, and waterfront development areas. Impacts are shown on the Freshwater Wetland Plans and Waterfront Development Plans and summarized in **Tables 20 and 21.**

1.1 FRESHWATER WETLAND AND TRANSITION AREA IMPACTS

Freshwater wetland impacts are those wetland and water areas located above the coastal wetland limit line (upper wetland limit boundary) as regulated by the Coastal Wetlands Act of 1970 to the wetland boundary as determined through the wetland delineation procedure and those wetland areas delineated during the wetland delineation procedure not associated with the upper wetland limit boundary. Transition areas were determined for all freshwater wetlands within the Project area based on best professional judgement as well as previous correspondence with the NJDEP.. Impacts to freshwater wetlands, transition areas and State open waters are summarized in **Table 20**. Detailed breakdowns by vegetation communities are contained in the Wetland Utility Crossing Tabulation tables on Wetland Permit Plan Sheets 3 through 16.

1.1.1 PERMANENT IMPACTS

The proposed Project will permanently impact 1.064 acres of freshwater wetlands. Approximately 0.843 acres of permanent wetland impacts are the result of construction of the Compressor Station 206. The design and placement of the compressor station was engineered with an understanding of the importance of avoidance and/or minimization of impacts to regulated areas. Transco notes that it has undertaken a number of facility design refinements to avoid impacts to regulated features within the footprint of the onsite facility and access road as described in Part III, **Sections 8 and 9**. Approximately 0.221 acres of permanent wetland impacts are the result of the construction of the Madison Loop. Impacts to regulated areas will also result along the Madison Loop portion of the Project in Old Bridge Township and Sayreville Borough, Middlesex County, NJ for the installation of the 26-inch-diameter loop pipe and ancillary activities including ATWS areas and access roads. Construction of the Raritan Bay Loops (onshore and offshore) will not result in impacts to freshwater wetlands.

In addition, the proposed Project will result in 1.325 acres of permanent impacts to freshwater wetland transition areas. Permanent impacts to transition areas include 0.491 for construction of Compressor Station 206 and 0.834 acres for construction of the pipeline (Madison Loop). No permanent impacts to State open waters are proposed.

1.1.2 Temporary Impacts

The proposed project will result in approximately 8.061 acres of temporary impacts that are less than six months in duration, including 2.796 acres of freshwater wetlands, 5.085 acres of transition areas and 0.180 acres of State open waters. These temporary impacts will occur as a result of construction access, work locations and construction laydown areas. Temporary disturbance to transition areas is within an existing maintained ROW and/or vacant fields and are not expected to result in significant impacts to adjacent freshwater wetlands.

TABLE 20. SUMMARY OF PROPOSED FRESHWATER WETLAND IMPACTS

COMPRESSOR STATION 206					
Permanent Disturbance (Acres)			**Temporary Disturbance (Acres)**		
Wetland	Transition Area	State Open Water	Wetland	Transition Area	State Open Water
0.843	0.491	-	0.148	0.450	-
MADISON LOOP					
Permanent Disturbance (Acres)			**Temporary Disturbance (Acres)**		
Wetland	Transition Area	State Open Water	Wetland	Transition Area	State Open Water
0.221	0.834	-	2.648	4.635	0.180
TOTAL IMPACTS					
Permanent Disturbance (Acres)			**Temporary Disturbance (Acres)**		
Wetland	Transition Area	State Open Water	Wetland	Transition Area	State Open Water
1.064	1.325	-	2.796	5.085	0.180

TABLE 21. IMPACTS TO REGULATED AREAS WITHIN WATERFRONT DEVELOPMENT AREA

FACILITY & MILEPOST	PERMANENT COASTAL WETLAND IMPACTS	TEMPORARY COASTAL WETLAND IMPACT	VEGETATIVE NON-WETLAND IMPACT	TIDELANDS IMPACT
Madison Loop				
10.69 - 10.74	0.003	0.141	0	0
10.87 - 10.94	0	0	0	0
11.36 - 11.42	0	0	0	0.003
11.43 - 11.60	0	1.131	0	0.035
11.77 - 11.94	0.162	0.097	0.581	0.017
Raritan Bay Loop (onshore)				
N/A	0	0	0	0
Total	**0.165**	**1.369**	**0.581**	**0.055**

1.2 COASTAL WETLAND IMPACTS

Coastal wetlands are those areas identified by the coastal wetland limit line (upper wetland limit boundary) as regulated by the Coastal Wetlands Act of 1970. This line is identified as the Promulgated Coastal Wetland Line 1970.

The Project will permanently impact 0.165 acres mapped coastal wetlands and approximately 1.369 acres of temporary impacts that are less than six months in duration to coastal wetlands. These temporary impacts will occur as a result of construction access and work locations.

1.3 WATERFRONT DEVELOPMENT IMPACTS

Pursuant to N.J.A.C. 7:7-2.4, the regulated waterfront area in those areas outside the CAFRA area and outside of the Hackensack Meadowlands District, the regulated WFD area includes:

i. All tidal waterways and lands lying thereunder, up to and including the mean high water line; and
ii. Adjacent upland areas within 100 feet of the MHWL. For properties within 100 feet of the mean high water line that extend inland beyond 100 feet from the mean high water line, the regulated waterfront area shall extend inland to the lesser of the following distances:
    (1) 500 feet from the mean high water line; or
    (2) To the first paved public road, railroad, or surveyable property line that existed on September 26, 1980; and generally parallels the waterway.

The proposed project will result in approximately 0.581 acres of vegetative non-wetland/transition area uplands and 0.055 acres of tidelands (Table 21). Impacts to freshwater wetlands and transition areas within the Waterfront Development Area can be authorized under the Freshwater Wetlands Protection Act.

2.0 PROPOSED RIPARIAN ZONE IMPACTS

The proposed Project will result in temporary and permanent impacts to regulated and non-regulated (actively disturbed) riparian zone. All impacts to riparian zones are associated with the Madison Loop. Temporary clearing, cutting, and/or removal of riparian zone vegetation within an actively disturbed area [N.J.A.C. 7:13-11.2(f)3] are not subject to the limits set forth in Table 11.2. Proposed impacts by crossing are summarized on **Table 22.**

A large majority of proposed impacts are temporary and/or will occur in actively disturbed areas. Temporary impacts will be revegetated to preconstruction conditions or better in the same location as the disturbance. Temporary impacts will be a result of construction access, including roads and workspace areas located outside the permanent easement, and HDD operations. Permanent impacts will be associated with the widening and ongoing maintenance of the pipeline easement.

The Project will result in approximately 1.6825 acres of permanent impacts including 0.7153 acres for construction of new pipeline and 0.9672 acre for construction access. In addition, approximately 1.8431 acres of actively disturbed areas will be temporary impacted by the Project.

TABLE 22. SUMMARY OF RIPARIAN IMPACTS

Watercourse ID	Watercourse Name	Milepost	Station	Actively Disturbed Area[1]	New Utility Line (N.J.A.C. 7:13-11.2(k))				Access to Project (N.J.A.C. 7:13-11.2(k))				Mitigation Required	Mitigation Proposed[3]
					Proposed Disturbance (square feet [acres])			Maximum Allowable Area of Riparian Zone Vegetation Disturbance (30 SF per linear foot of utility line)	Proposed Disturbance (square feet [acres])			Maximum Allowable Disturbance (per crossing for 50 foot riparian zone)		
				Total	Temporary	Permanent (Forest Conversion)	Total		Temporary Impact to Forested (Permanent Impacts/ Restoration)[2]	Permanent (Forest Conversion)	Total			
WW-T01-001 WW-T01-001A	Unnamed Tributary to Tennent Brook	8.61 & 8.62	101+48	3,465 SF (0.0795 AC)	-	3,537 SF (0.081 AC)	3,537 SF (0.081 AC)	4,320 SF (0.099 AC)	-	3,381 SF (0.078 AC)	3,381 SF (0.078 AC)	1,000 SF (0.023 AC)	2,381 SF (0.055 AC)	TBD
WW-T01-002B	Unnamed Tributary to Tennent Brook	8.70	106+24	7,633 SF (0.1752 AC)	-	1,341 SF (0.031 AC)	1,341 SF (0.031 AC)	3,630 SF (0.083 AC)	-	-	-	-	-	-
WW-T01-002B	Unnamed Tributary to Tennent Brook	8.76	109+18	2,745 SF (0.0630 AC)	-	3,614 SF (0.083 AC)	3,614 SF (0.083 AC)	3,660 SF (0.084 AC)	4,005 SF (0.092 AC)	1,223 SF (0.028 AC)	5,228 SF (0.120 AC)	1,000 SF (0.023 AC)	4,228 SF (0.097 AC)	TBD
WW-T01-002B	Unnamed Tributary to Tennent Brook	8.76A	-	-	-	-	-	-	3,341 SF (0.077 AC)	-	3,341 SF (0.077 AC)	1,000 SF (0.023 AC)	2,341 SF (0.054 AC)	TBD
WW-T01-002B	Unnamed Tributary to Tennent Brook	8.76B	-	-	-	-	-	-	8,413 SF (0.193 AC)	-	8,413 SF (0.193 AC)	1,000 SF (0.023 AC)	7,413 SF (0.170 AC)	TBD
WW-T15-004B WW-T15-005	Unnamed Tributary to Tennent Brook	9.26	Approx. 135+33	7,991 SF (0.1834 AC)	-	-	-	-	10,109 SF (0.232 AC)	2,456 SF (0.0564 AC)	12,565 SF (0.2885 AC)	2,000 SF (0.0459 AC)	10,565 SF (0.2425 AC)	TBD
WW-T01-004	Unnamed Tributary to Cheesequake Creek	10.05	177+41	6,639 SF (0.152 AC)	-	4,560 SF (0.105 AC)	4,560 SF (0.105 AC)	5,010 SF (0.115 AC)	994 SF (0.023 AC)	-	994 SF (0.023 AC)	1,000 SF (0.023 AC)	-	-
WW-T07-001	Unnamed Tributary to Cheesequake Creek	11.36	240+44-249+78	49,719 SF (1.1414 AC)	-	18,080 SF (0.4151 AC)	18,080 SF (0.4151 AC)	18,120 SF (0.416 AC)	8,210 SF (0.1885 AC)	-	8,210 SF (0.1885 AC)-	1,000 SF (0.023 AC)	7,210 SF (0.1655 AC)	TBD
WW-T07-001	Unnamed Tributary to Cheesequake Creek	11.43	205+31	799 SF (0.0183 AC)										
WW-T07-001	Cheesequake Creek	11.77	268+16	1425 SF (0.0327 AC)										
TOTAL				**80,416 SF (1.8431 AC)**	-	**31,159 SF (0.7153 AC)**	**31,159 SF (0.7153 AC)**	**34,740 SF (0.7975 AC)**	**35,072 SF (0.8051 AC)**	**7,060 SF (0.162 AC)**	**42,132 SF (0.9672 AC)**	**8,000 SF (0.1837 AC)**	**34,138 SF (0.7837 AC)**	**TBD**

[1] – Temporary clearing, cutting, and/or removal of riparian zone vegetation within an actively disturbed area [N.J.A.C. 7:13-11.2(f)3] is not subject to the limits set forth in Table 11.2

[2] – Temporarily cleared, cut, and/or removed riparian zone vegetation will be re-vegetated to extent practicable in coordination with NJDEP.

[3] – For the construction of a new roadway crossing a water [N.J.A.C. 7:13-11.2(h)] and a new underground utility line [N.J.A.C. 7:13-11.2(k)], mitigation shall be provided, in accordance with N.J.A.C. 7:13-13, for the area of vegetation that is cleared, cut, and/or removed in excess of the limits set forth in Table 11.2. Mitigation will be developed in consultation with NJDEP and a plan will be provided at a later date under separate cover.

Key

AC = acres ID = identifier N.J.A.C = New Jersey Administrative Code SF = square feet TBD = to be determined

3.0 MITIGATION

Project-related impacts to wetlands and open waters, coastal wetlands, and waterfront development areas have been avoided to the maximum extent possible and practicable. Where impacts could not be avoided, measures have been implemented to minimize impacts.

3.1 MITIGATION FOR FRESHWATER AND COASTAL WETLAND PERMANENT IMPACTS

Pursuant to N.J.A.C. 7:7A-7.21(e) mitigation is required for all permanent loss and/or disturbance of 0.1 acre or greater of freshwater wetlands or State open waters. Mitigation is also required for permanent loss and/or disturbance of less than 0.1 acre of freshwater wetlands or State open waters unless the applicant demonstrates to the NJDEP that all activities have been designed to avoid and minimize impacts to wetlands.

The Project spans two major drainage basins and three Watershed Management Areas (WMA) including the Raritan WMA09 which includes the lower Raritan River, as well as portions of the South River and Lawrence River basins; the Monmouth WMA12 which includes the Atlantic Coastal basin; and the Millstone WMA10 which also includes the Raritan River watershed.

The Project will result in permanent disturbance to 1.064 acres of wetlands as currently proposed. No permanent impacts to State open water will result from the Project. See **Table 23** for a breakdown of impacts by wetland type and by WMA. Riparian Zone mitigation (0.7837 acres) will also be required in accordance with the Flood Hazard Area Control Act Rules at N.J.A.C. 7:13.

TABLE 23 . PROJECTED PERMANENT WETLAND IMPACTS BY WETLAND TYPE

PROJECT (WMA)	PERMANENT WETLAND IMPACT (AC) BY COWARDIN CLASS				TOTAL IMPACT (AC)
	PFO	PSS	PEM	SOW	
Compressor Station 206 (WMA 10)	0.530	-----	0.313	-----	0.843
Madison Loop (WMA 9)	0.208	-----	-----	-----	0.208
Madison Loop (WMA 12)	0.013	-----	-----	-----	0.013
TOTAL	**0.751**	**-----**	**0.313**	**-----**	**1.064**

The proposed Project is considered a smaller disturbance (i.e., <1.5 acres) as defined at NJAC 7:7A-11.9. The Project spans the two major drainage basins in WMA09 and WMA12 on the Madison Loop. Since 87% of the wetland impacts on the Madison Loop are located within WMA9, Transco understands that there is a compelling need to provide compensatory mitigation within WMA9. The compensatory mitigation hierarchy defined at NJAC 7:7A-11.10 provides some flexibility for applicants to consider credit purchase from mitigation banks, onsite mitigation, or mitigation projects within the watershed / drainage basin with NJDEP consideration of size, habitat value, location and interaction with nearby resources. Transco will purchase wetland mitigation credits to satisfy the compensatory mitigation required for the project from existing NJDEP approved banks within WMA9 and in WMA12 as needed for the Madison Loop and in WMA 10 for the Compressor Station 206 portion of the project.

Transco is in the process of purchasing the credits necessary to offset the permanent impacts from WMAs 9 and 10 from Cranbury Mitigation Bank and the Evergreen Marsh Bog Brook Mitigation Bank for WMA 12. Copies of the purchase agreement will be provided to the NJDEP Mitigation Unit once finalized.

Transco/Williams is requesting authorization to satisfy the riparian mitigation for WMA 9 through credit purchase of the Cranbury Mitigation Bank in WMA 10 due to the small size of impact and no other available banks within WMA 10. As the acreage requiring offsite mitigation is under an acre, the likelihood of success in finding suitable locations and having a successful offsite mitigation project within WMA 10 is low.

Additionally, the authorized permanent impact to coastal wetlands is strictly based on the forested habitat (both in wetlands and in uplands) being cleared for the project and falling within the promulgated wetland line at the transitional fringe of tidal/freshwater wetlands. Onsite conditions of delineated wetland areas for the 0.165 acres of impact are of freshwater wetland species, noted of phragmites, green brier, red maple and sweetgum, with the area lying above the mean high-water line for the authorized permanent impacted areas.

Transco/Williams is requesting the purchase of credits through the Evergreen Marsh Bog Brook Mitigation Bank in what they have authorized for FWW wetland zones to compensate for the 0.165 acres of coastal impacts as there is no coastal wetland credits available/authorized within the bank. Transco will coordinate with the mitigation bank regarding purchase of necessary credits. As an alternative mitigation approach to coastal wetland impacts, Transco may request that a monetary contribution be made in lieu of a credit purchase if they are not available in another WMA that is acceptable to the NJDEP.

A Freshwater Wetland, Waterfront Development, Coastal Wetland and Riparian Impact Mitigation Proposal will be submitted to the NJDEP Mitigation Unit for review and approval.

3.2 Mitigation for Riparian Zone Vegetation Permanent Impacts

Transco will provide mitigation, in accordance with N.J.A.C. 7:13-13, for the area of vegetation that is permanently cleared, cut, and/or removed in excess of the limits set forth in NJDEP Table 21 [N.J.A.C. 7:13-11.2(k)]. Transco is coordinating with the NJDEP Mitigation Unit regarding Transco's plans for mitigation. Transco will submit its mitigation plan based on consultations with NJDEP under separate cover. Temporarily cleared, cut, and/or removed riparian zone vegetation will be re-planted in-place and consist of vegetation of equal or greater ecological function and value as the vegetation that was cleared, cut, or removed in accordance with N.J.A.C. 7:13-11.2(a) and (z). In accordance with N.J.A.C. 7:13-11.2(f)3, temporary clearing, cutting, and/or removal of riparian zone vegetation within an actively disturbed area is not subject to the limits set forth in NJDEP Table 11.2. Refer to **Table 22** for anticipated mitigation requirements by crossing.

3.3 Mitigation for Temporary Impacts

Temporary impacts less than six months in duration to freshwater wetlands and waters, freshwater wetland transition areas, coastal wetlands and waterfront development areas are proposed due to construction activities. Mitigation in the form of restoration of these areas will be completed upon completion of the proposed Project, as necessary.

Temporarily disturbed areas will be restored to their pre-existing conditions. All disturbed areas will be provided with a permanent native vegetative cover, which will be submitted to the NJDEP Mitigation Unit for review and approval, and in accordance with the standards for permanent vegetative cover provided in the *Standards for Soil Erosion and Sediment Control in New Jersey,* the project specific Soil Erosion and Sediment Control Plan approved by the Cumberland Salem Soil Conservation District, or as directed by Transco Environmental Management. Should these restoration activities occur during inappropriate seasons for seeding (i.e., November through February), they will be stabilized with mulch in accordance with the standards for mulch provided in the *Standards for Soil Erosion and Sediment Control in New Jersey*. Such areas shall be provided with permanent vegetative cover (i.e., seed and new mulch applied) at the next appropriate growing season. All soil erosion and sediment control measures installed prior to soil disturbances will be maintained until stabilization is accomplished.

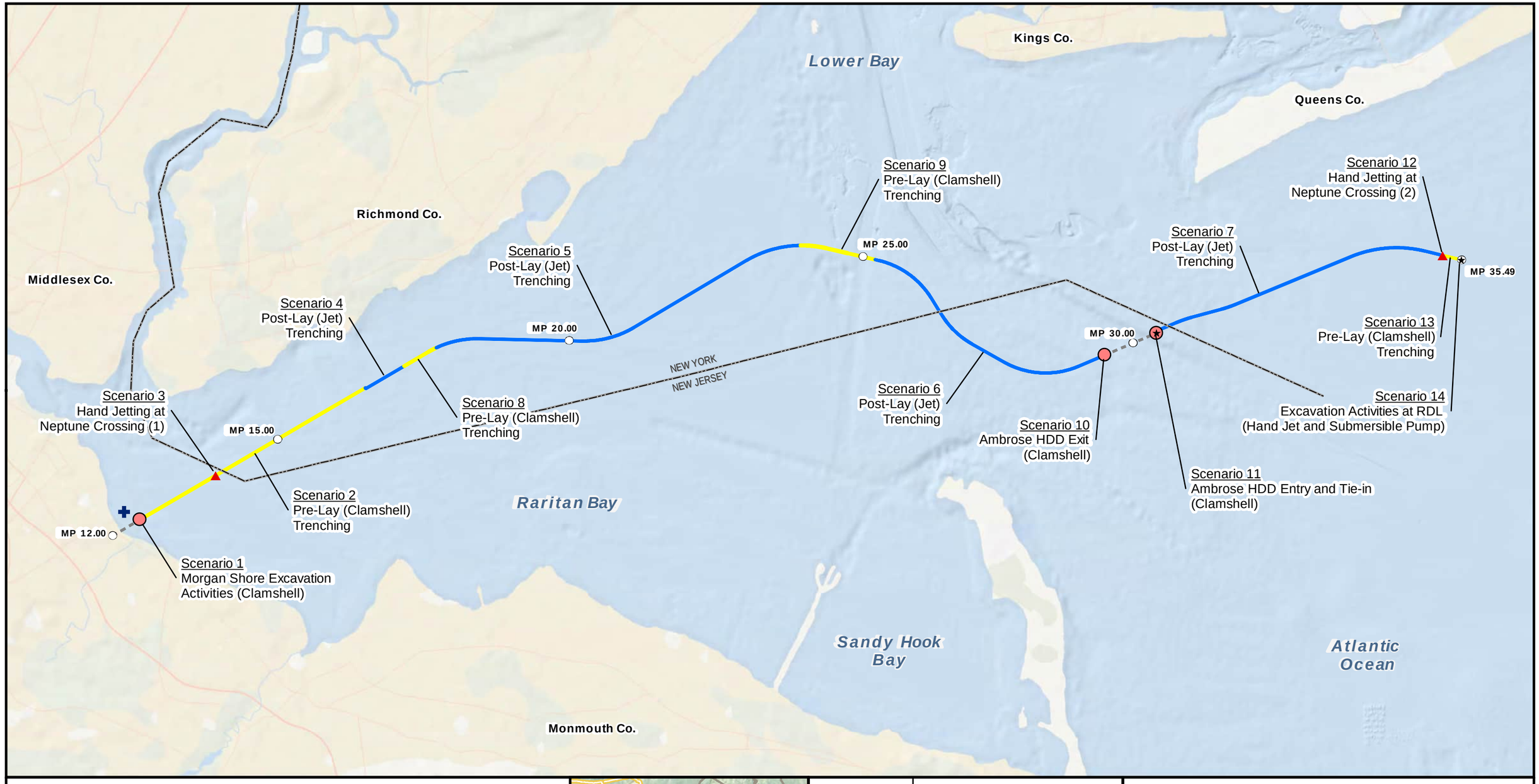
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

NORTHEAST SUPPLY ENHANCEMENT PROJECT

ENVIRONMENTAL REPORT

ADDITIONAL FIGURES

NOVEMBER 2025



Legend

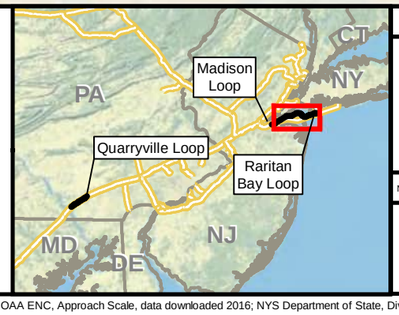
- HDD Pit
- Anode Sled Excavation
- Cable Crossing
- Tie-in Point
- Milepost
- NY/NJ Boundary

Proposed Raritan Bay Loop
- Post-Lay (Jet) Trenching
- Pre-Lay (Clamshell) Trenching
- Horizontal Directional Drilling

N

0 0.5 1

Miles



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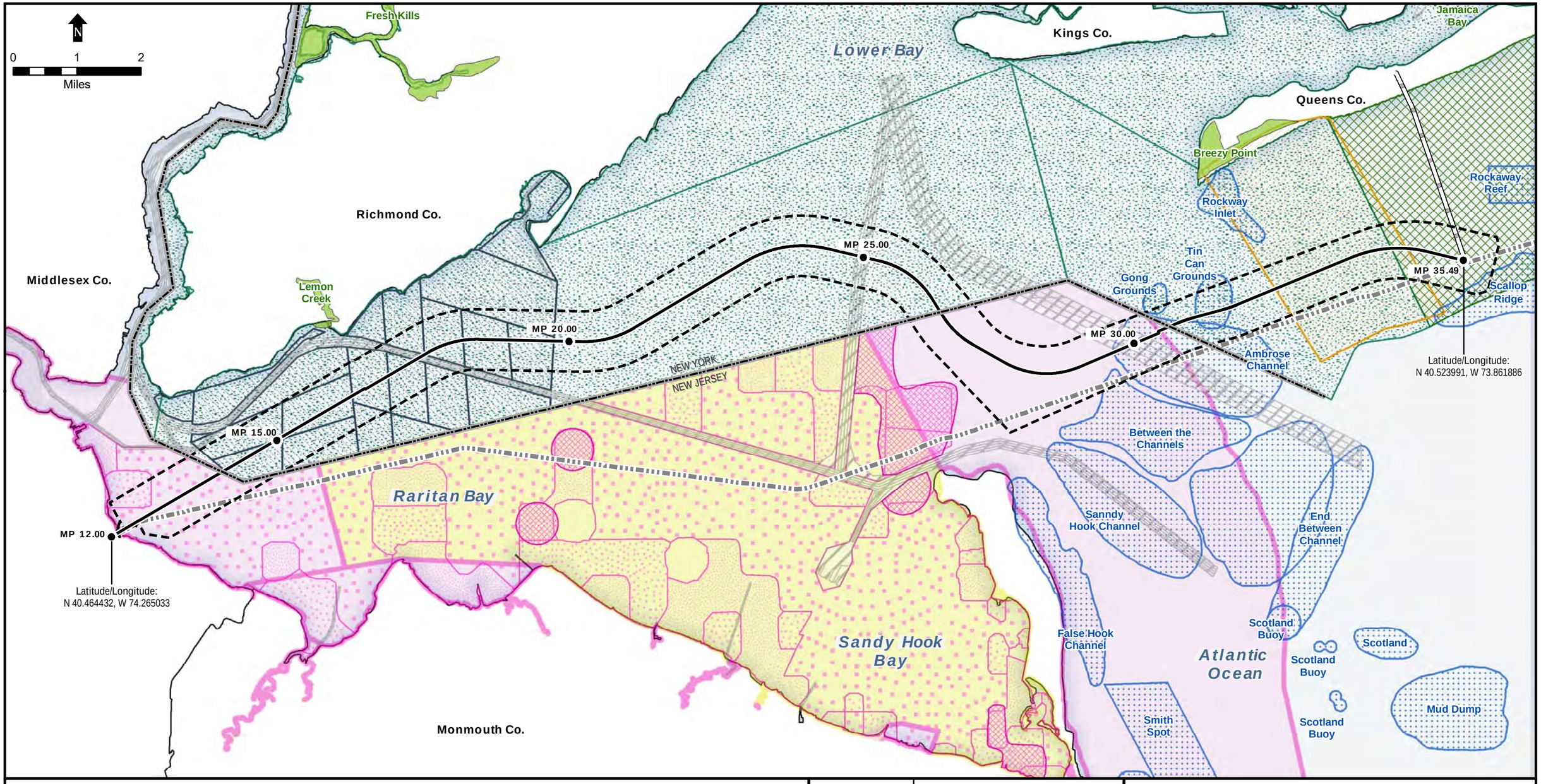
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A	6/1/2018	MK	ISSUED FOR PERMITTING	1000891	RS	SM

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
INDEX MAP FOR
OFFSHORE EXCAVATION SEDIMENT MODELING SCENARIOS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

DRAWN BY: MK	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: RS	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 10	SHEET 1 OF 1
WO: 1000891		1:50 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- Temporary Workspace
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Maintained Navigation Channel
- NYSDOS Significant Habitats
- NJDEP Surfclam Distribution (2014)

NJ DEP Hard Clam Relative Abundance (2014)

- High
- Moderate
- Low

- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Transplantation
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NY Shellfish Land - Certified

NJ Shellfish Growing Water

- Prohibited Harvest Area
- Special Restricted Harvest Area
- Suspended Harvest Area

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
RESOURCE LAYERS FOR
SEDIMENT MODELING SCENARIO ANALYSIS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

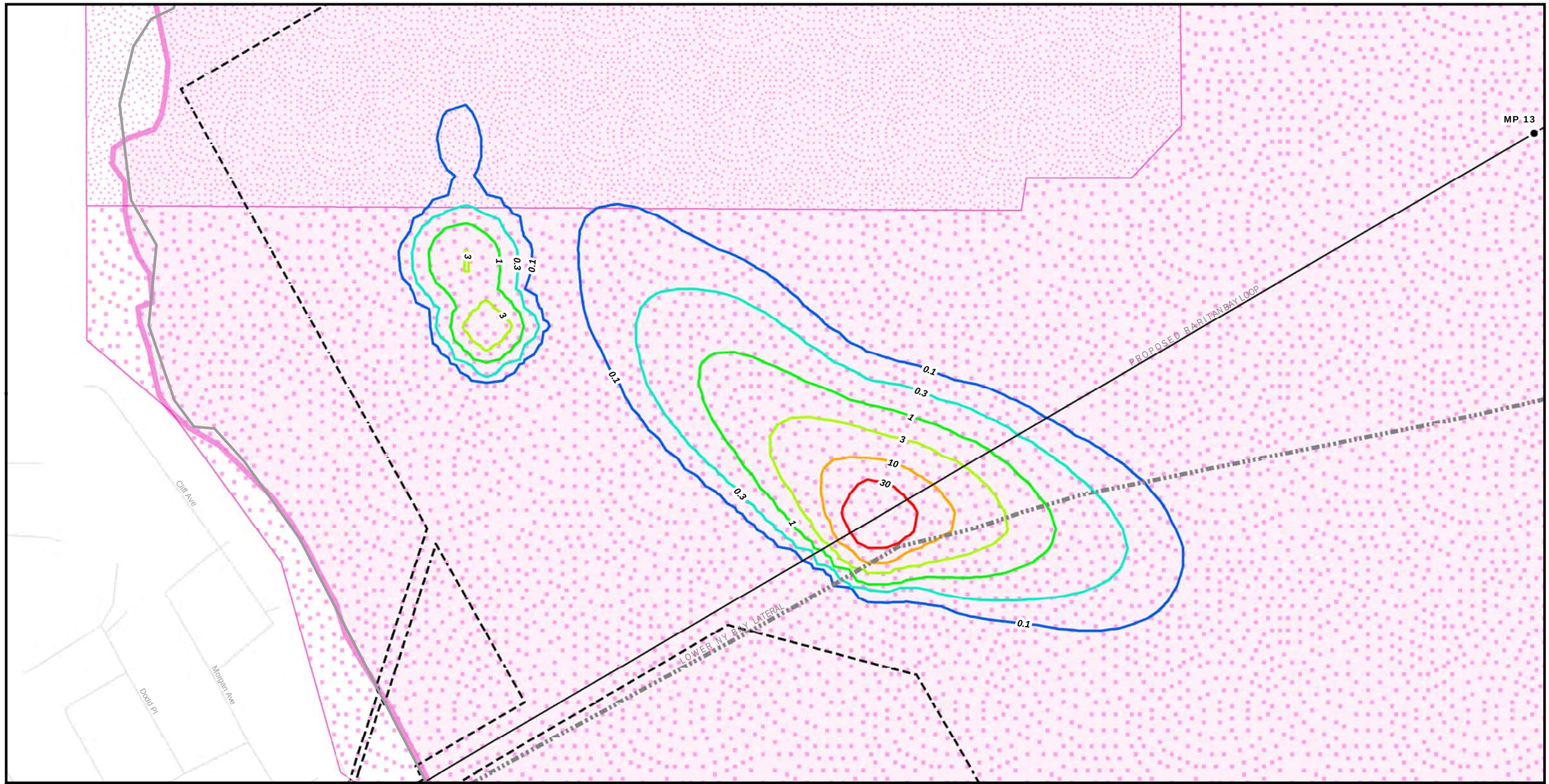
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 11	SHEET 1 OF 1
WO: 1000891		1:55 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



N

0 100 200

Feet

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 1: MORGAN SHORE EXCAVATION ACTIVITIES
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

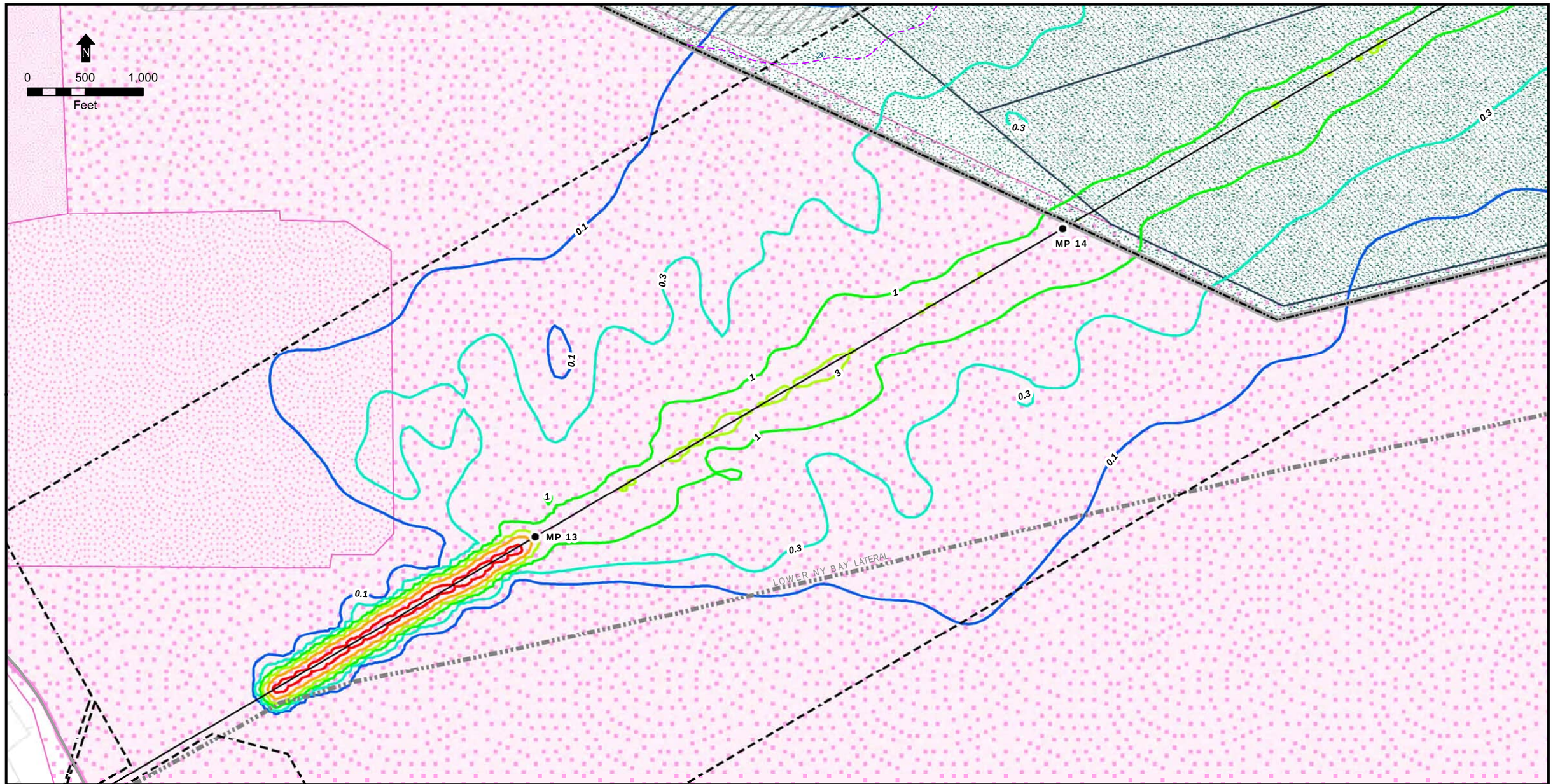
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APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 12	SHEET 1 OF 1
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Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water

- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)

- High
- Moderate
- Low

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 2: CLAMSHELL TRENCHING BETWEEN
MORGAN HDD AND MIDLINE TIE-IN
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

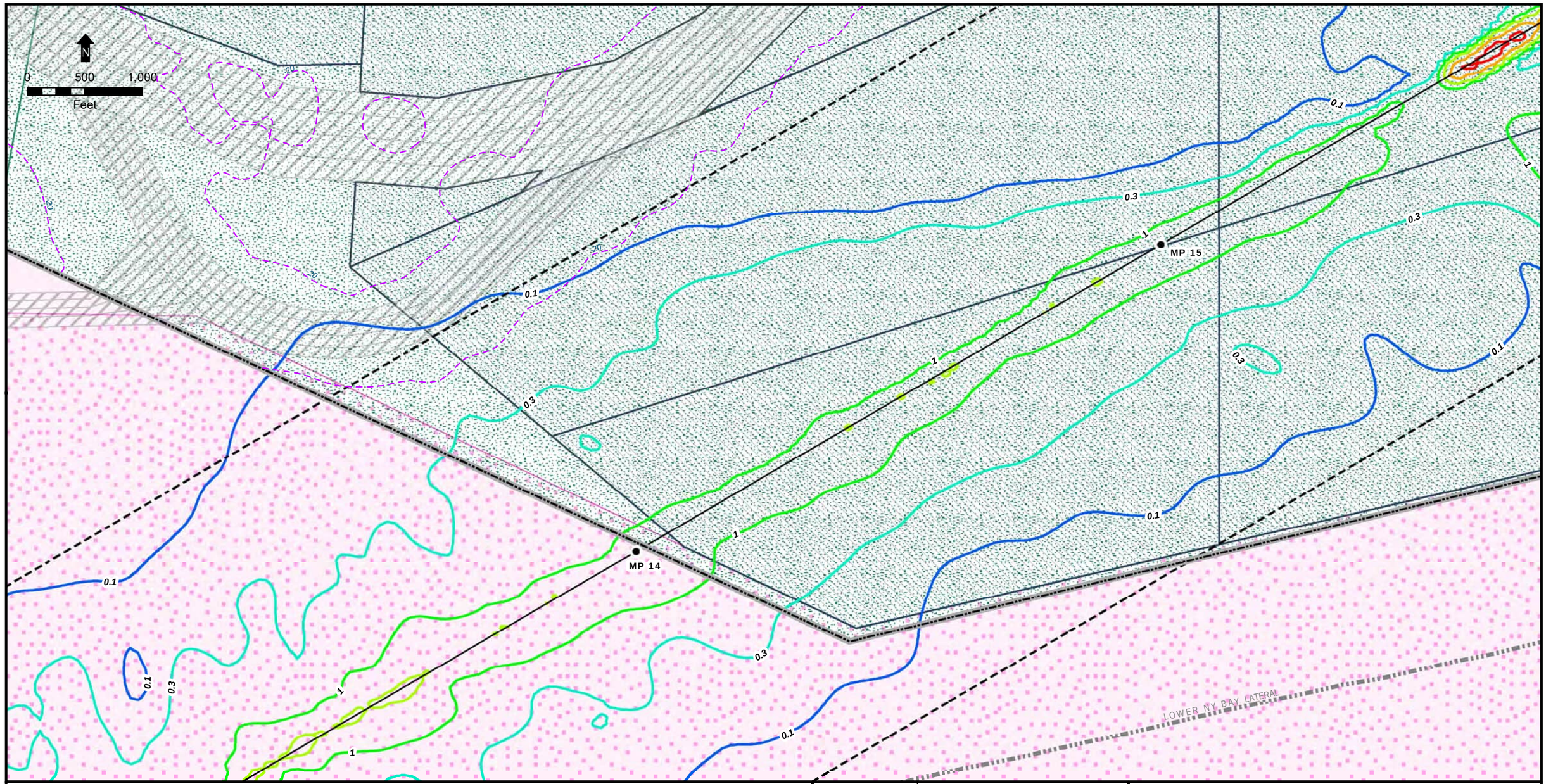
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APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 13	Page 1 of 4
WO: 1000891		2:52 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water

- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)

- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 2: CLAMSHELL TRENCHING BETWEEN
MORGAN HDD AND MIDLINE TIE-IN
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

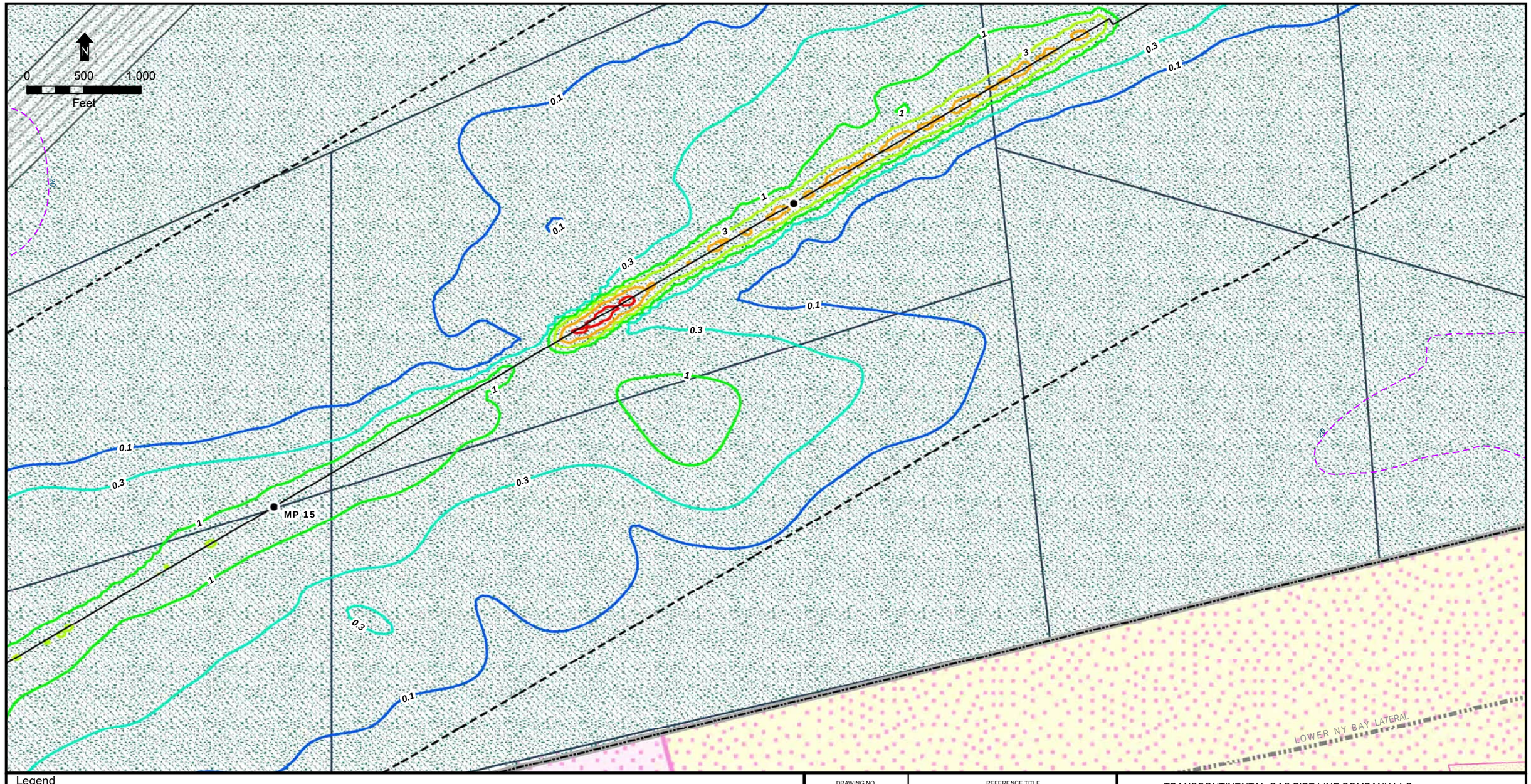
Williams

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APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 14
WO: 1000891		2:54 PM 6/1/2018	Page 2 of 4

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water

- Prohibited Harvest Area
- Special Restricted Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)

- High
- Low

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



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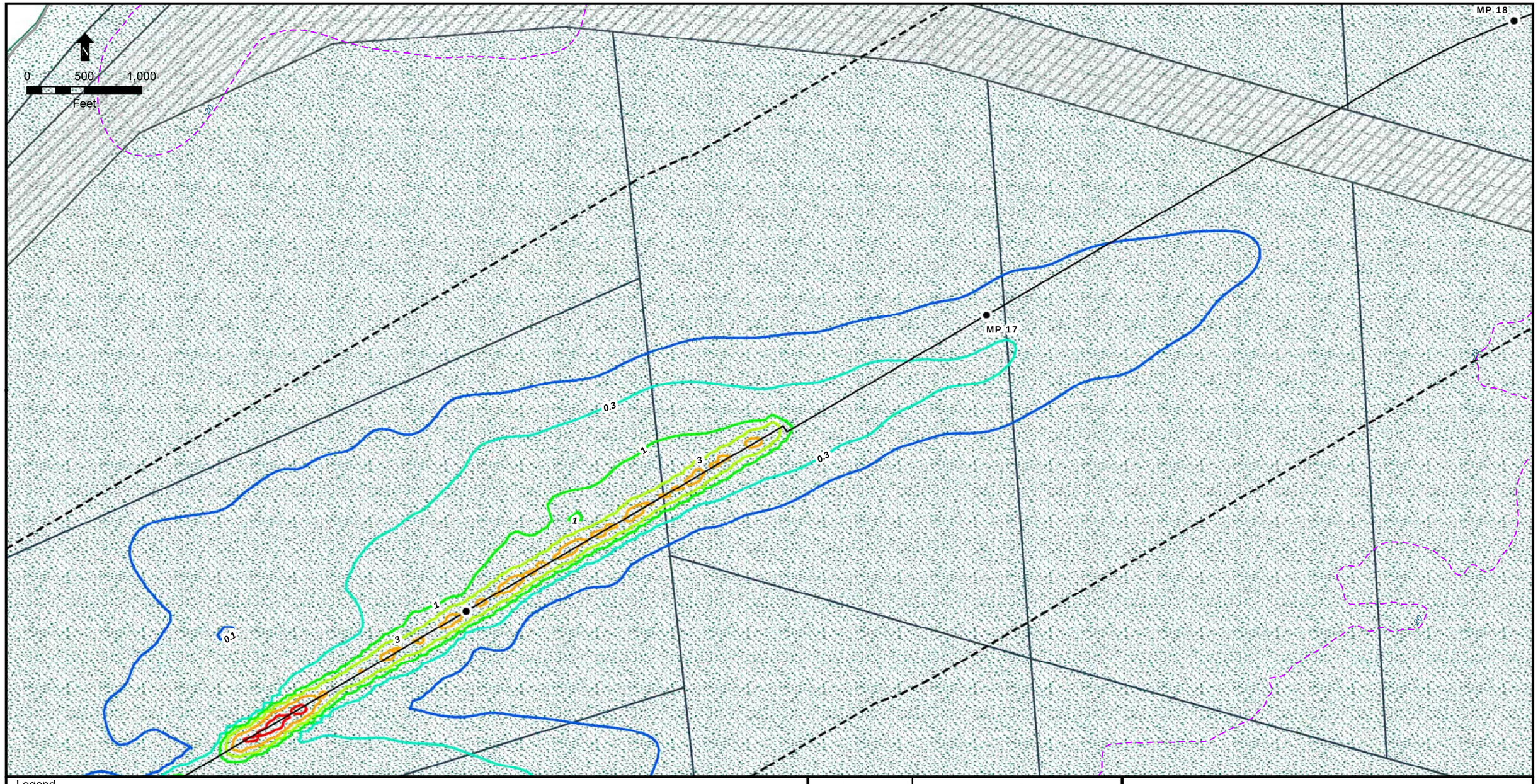
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 2: CLAMSHELL TRENCHING BETWEEN
MORGAN HDD AND MIDLINE TIE-IN
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: 2:55 PM 6/1/2018	FIGURE 15
WO: 1000891			Page 3 of 4

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 2: CLAMSHELL TRENCHING BETWEEN
MORGAN HDD AND MIDLINE TIE-IN
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

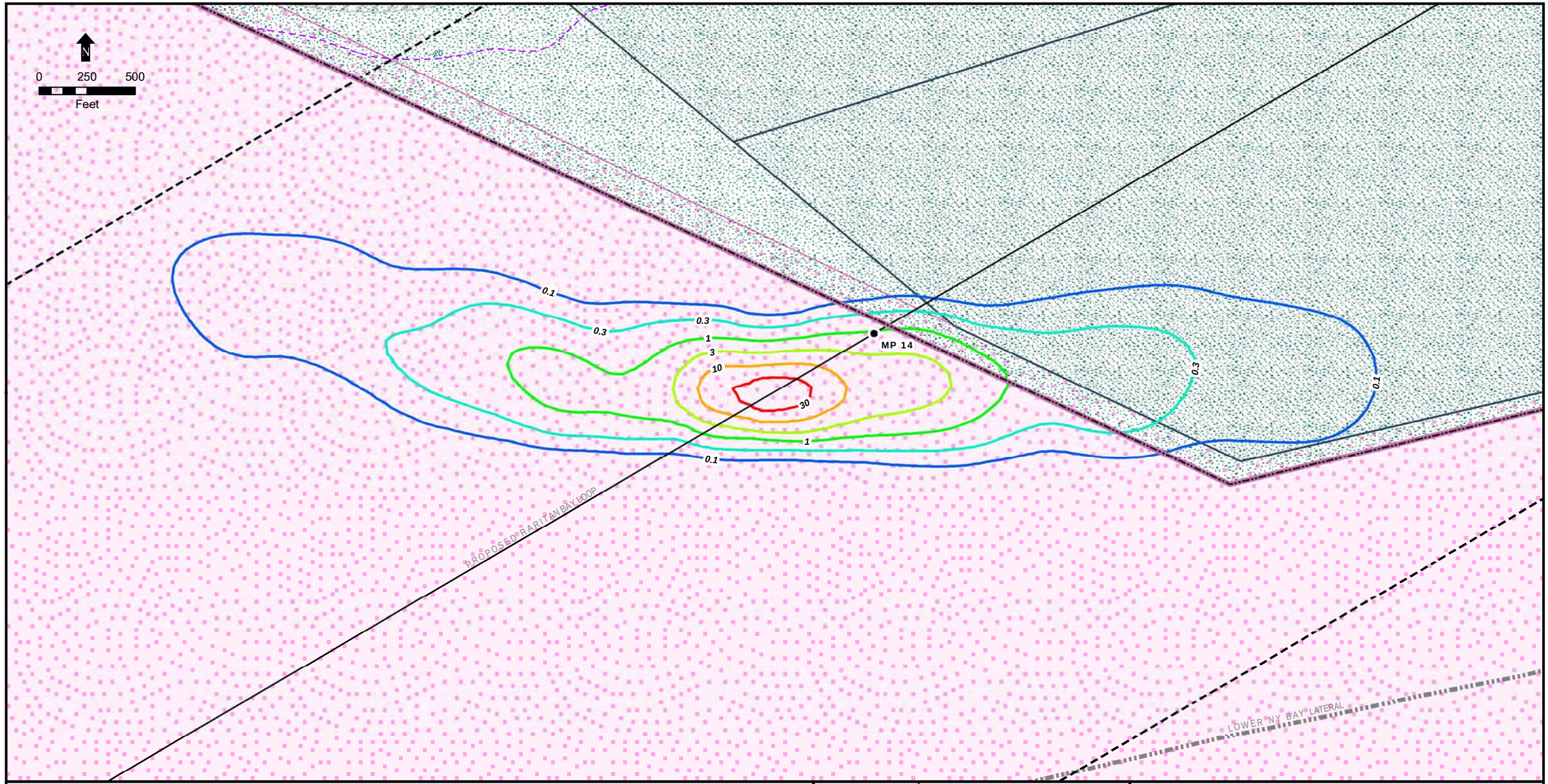
Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 16	Page 4 of 4
WO: 1000891		2:57 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)

- High
- Moderate
- Low

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 3: JETTING AT THE NEPTUNE CABLE CROSSING
IN RARITAN BAY
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

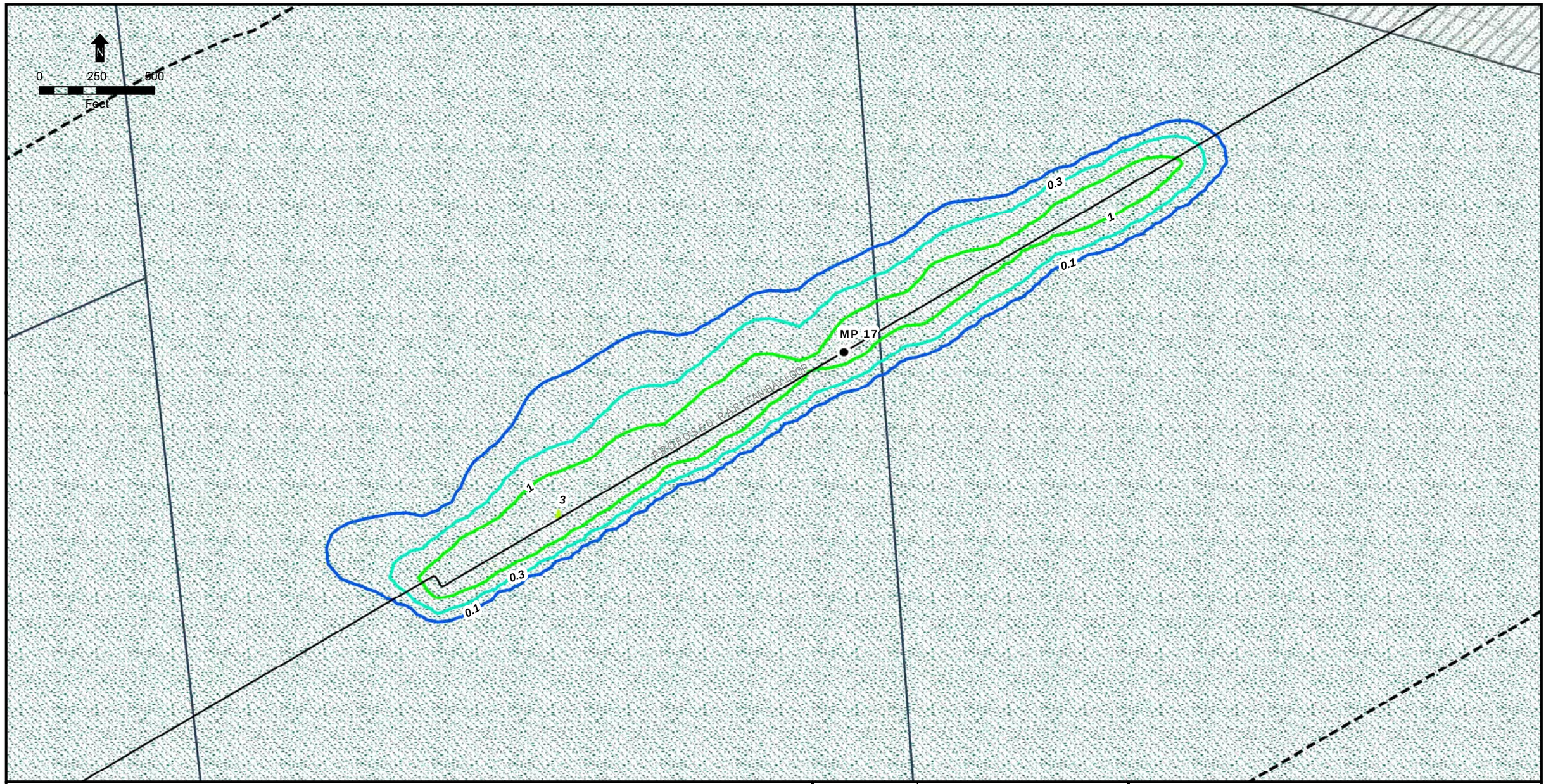
Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 17	SHEET 1 OF 1
WO: 1000891		2:58 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Maintained Navigation Channel
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 4: JET TRENCHING BETWEEN MIDLINE TIE-IN AND RARITAN CHANNEL TRANSITION
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

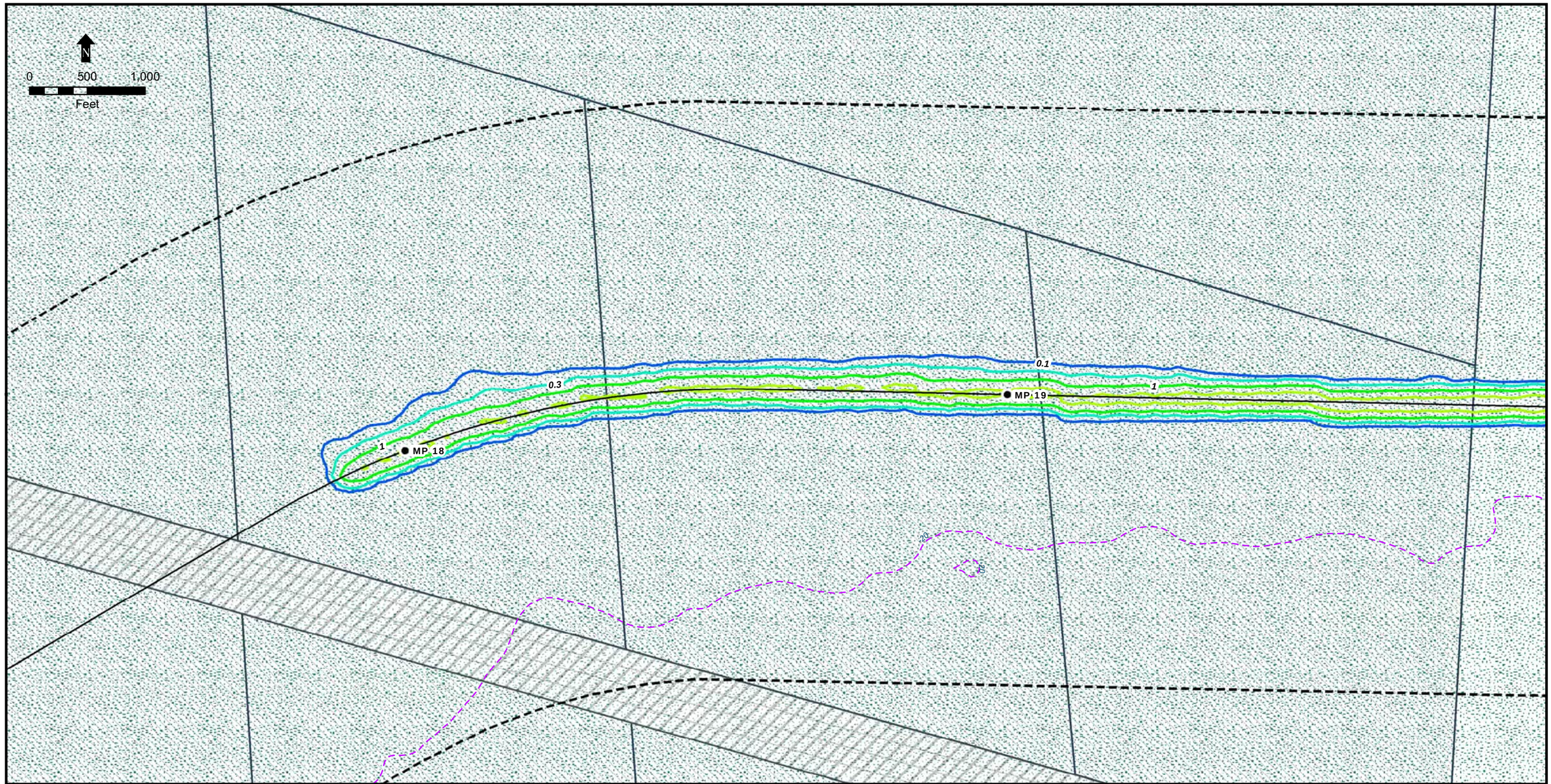
DRAWN BY: RS DATE: 6/1/2018
CHECKED BY: MK DATE: 6/1/2018
APPROVED BY: SM DATE: 6/1/2018
WO: 1000891

ISSUE FOR BID: N/A
ISSUE FOR CONSTRUCTION: N/A
Project features ver20

DRAWING NUMBER: FIGURE 18
SHEET 1 OF 1
3:02 PM 6/1/2018

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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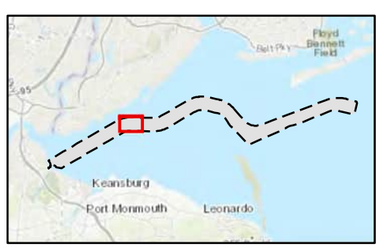


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 5: JET TRENCHING BETWEEN CURVE 1
AND ANCHORAGE AREA
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

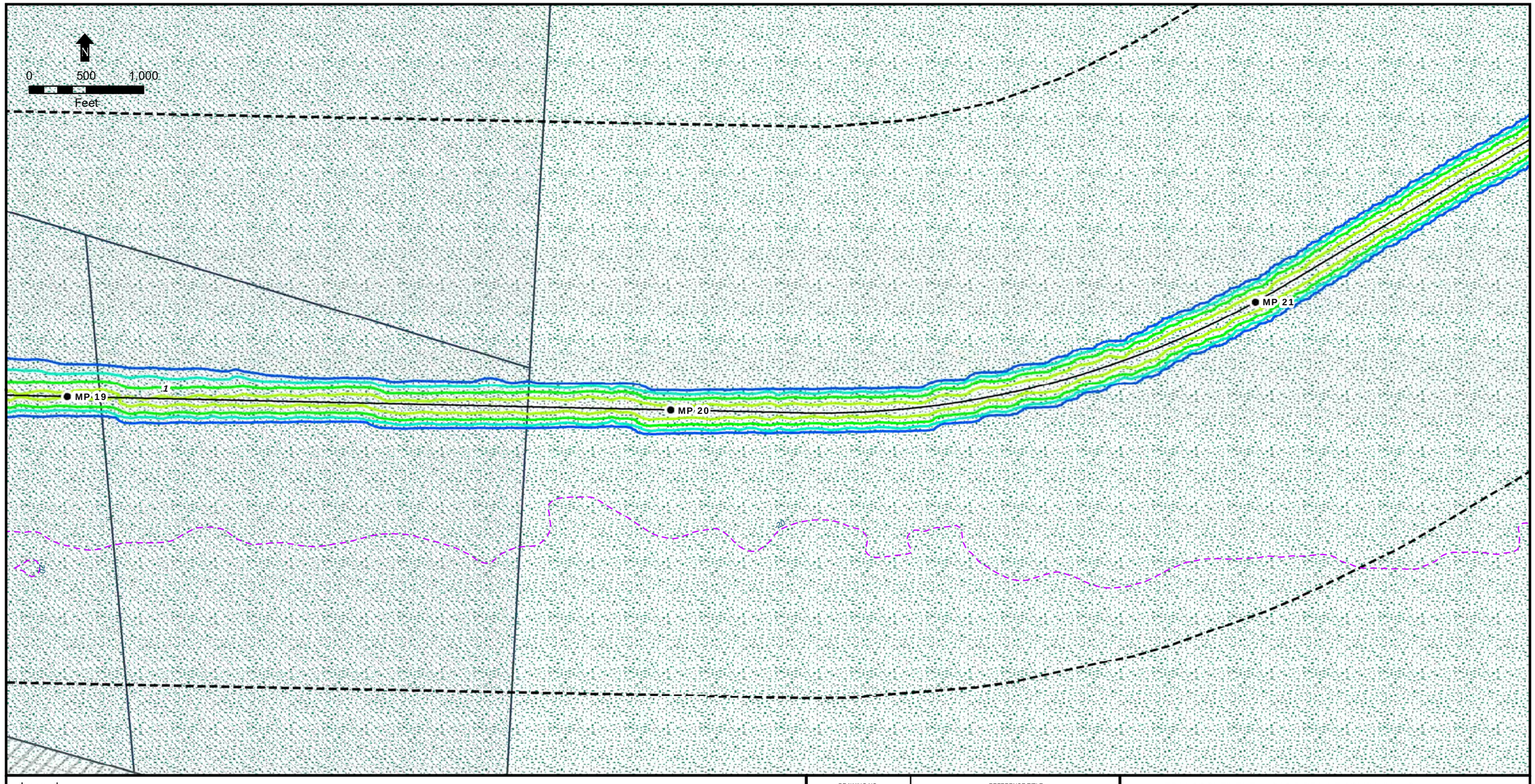
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 19
WO: 1000891		3:04 PM 6/1/2018	Page 1 of 4

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

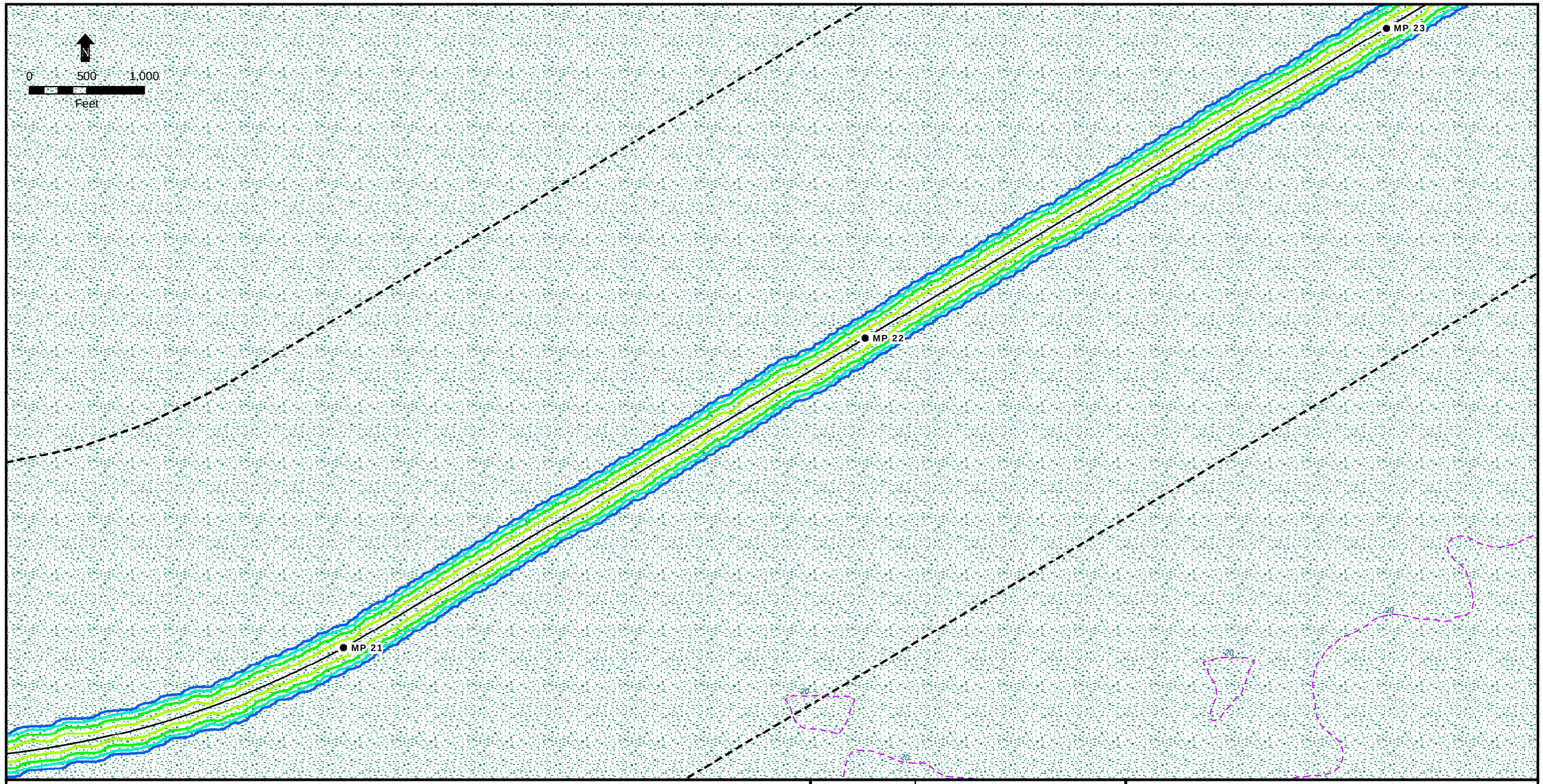
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 5: JET TRENCHING BETWEEN CURVE 1
AND ANCHORAGE AREA
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 20	Page 2 of 4
WO: 1000891		3:06 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 5: JET TRENCHING BETWEEN CURVE 1
AND ANCHORAGE AREA
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

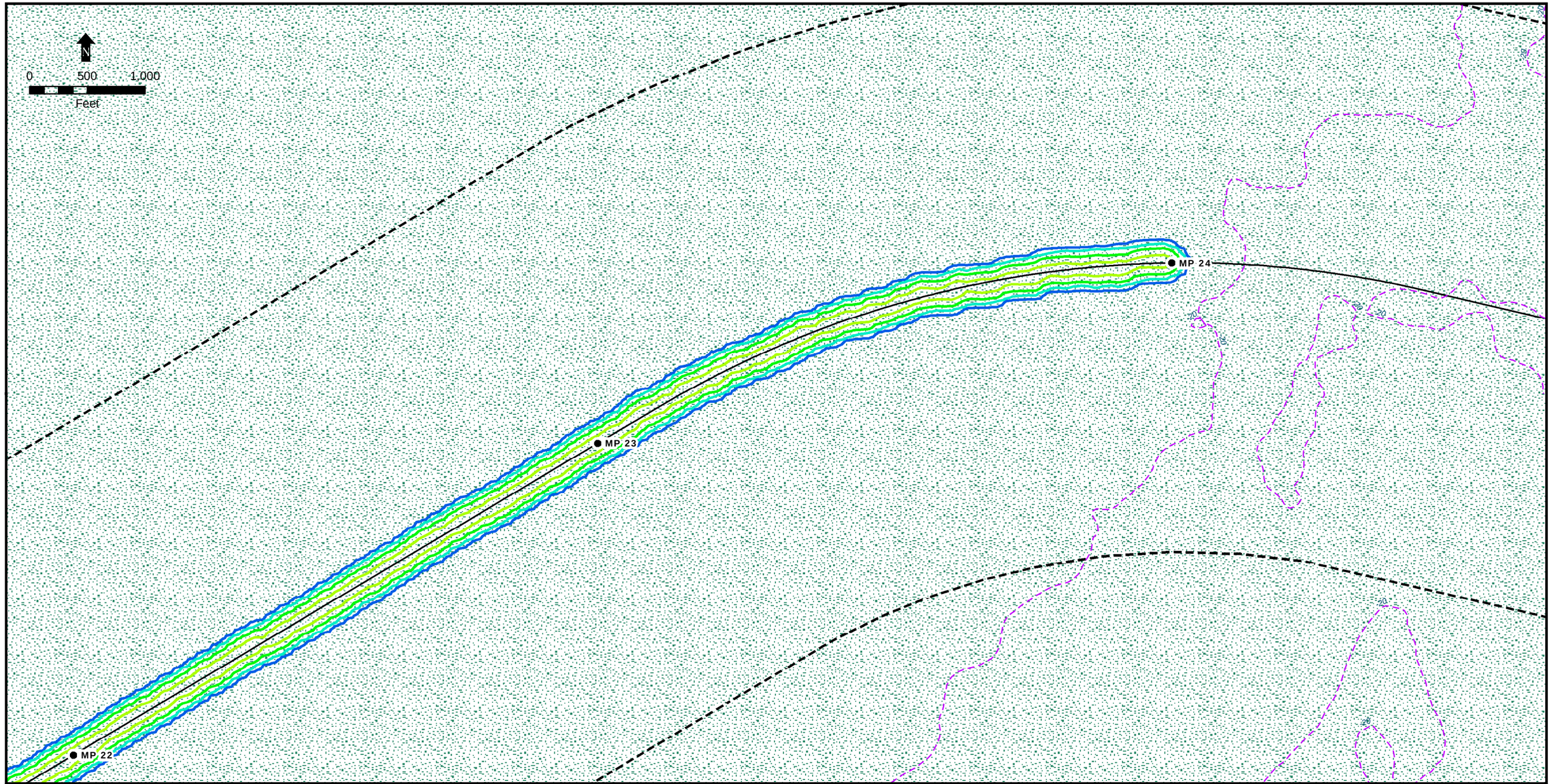
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 21	Page 3 of 4
WO: 1000891		3:07 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 5: JET TRENCHING BETWEEN CURVE 1
AND ANCHORAGE AREA
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

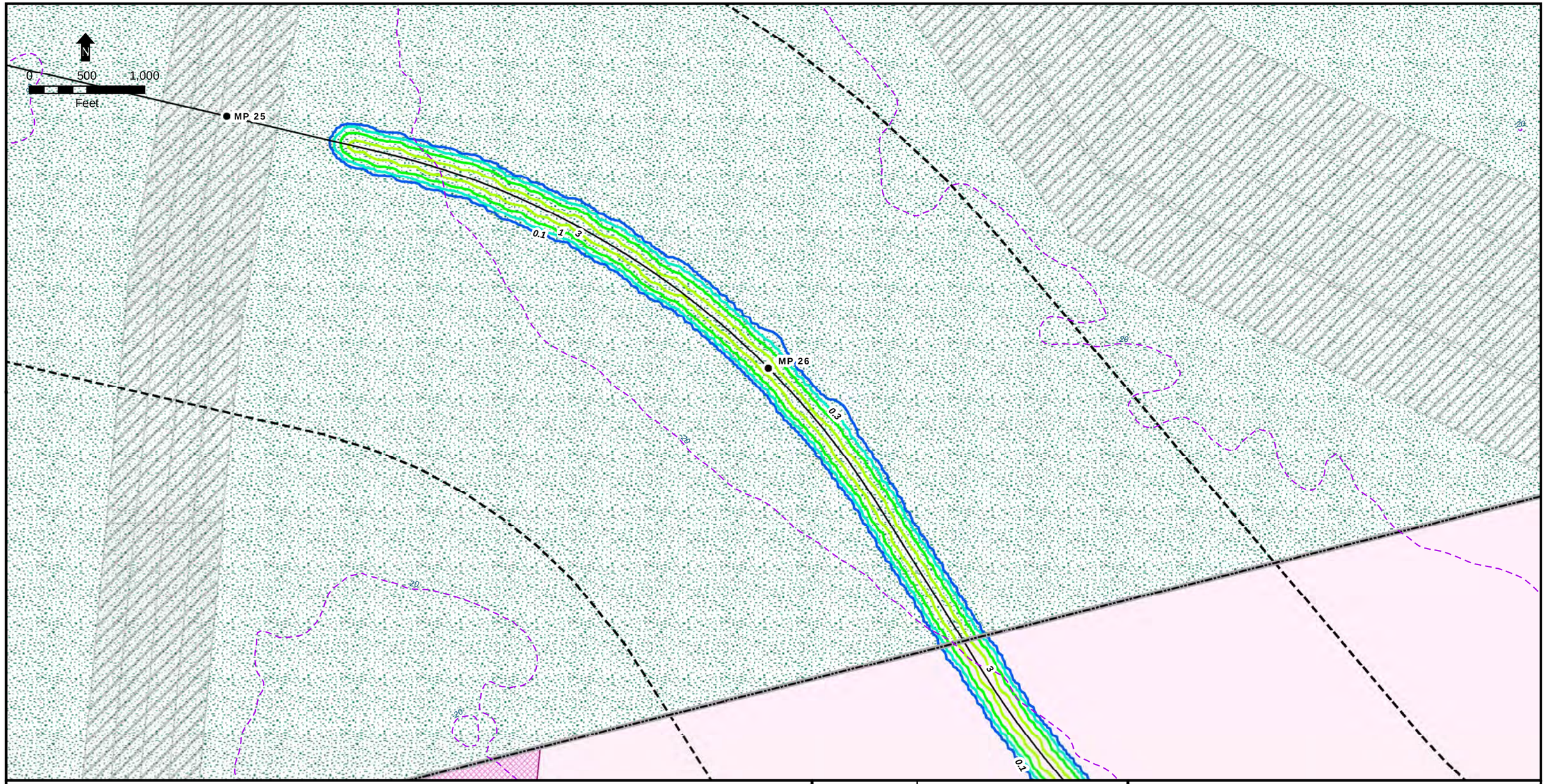
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 22
WO: 1000891		3:09 PM 6/1/2018	Page 4 of 4

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJDEP Surfclam Distribution (2014)

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 6: JET TRENCHING BETWEEN CURVE 4
AND AMBROSE CHANNEL
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

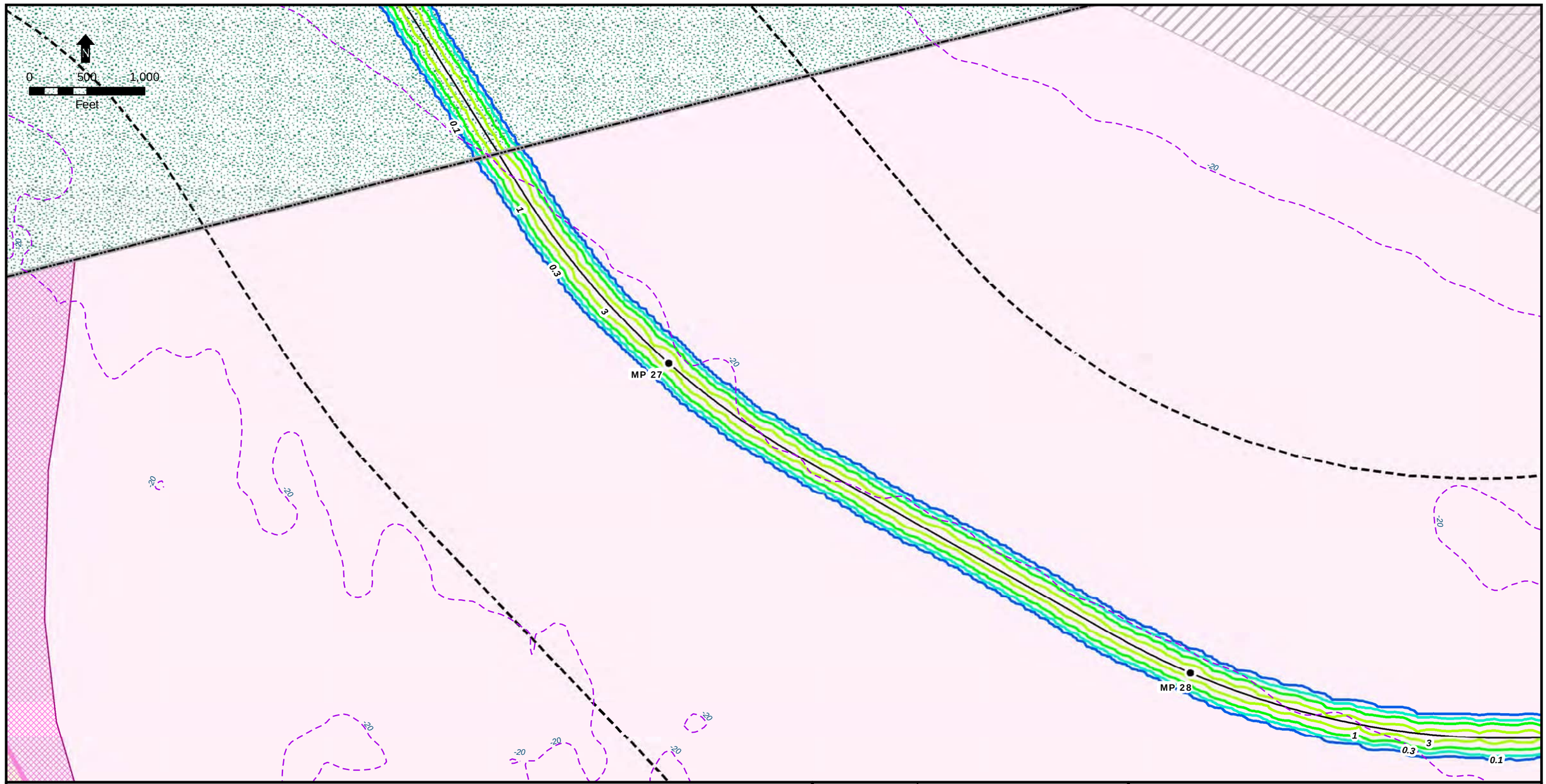
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 23	Page 1 of 3
WO: 1000891		3:09 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour

- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- Special Restricted Harvest Area
- NJDEP Surfclam Distribution (2014)

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 6: JET TRENCHING BETWEEN CURVE 4
AND AMBROSE CHANNEL
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

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APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 24	Page 2 of 3
WO: 1000891		3:11 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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0 500 1,000
Feet

MP 28
MP 29
MP 30
LOWER NY BAY LATERAL

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 6: JET TRENCHING BETWEEN CURVE 4
AND AMBROSE CHANNEL
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

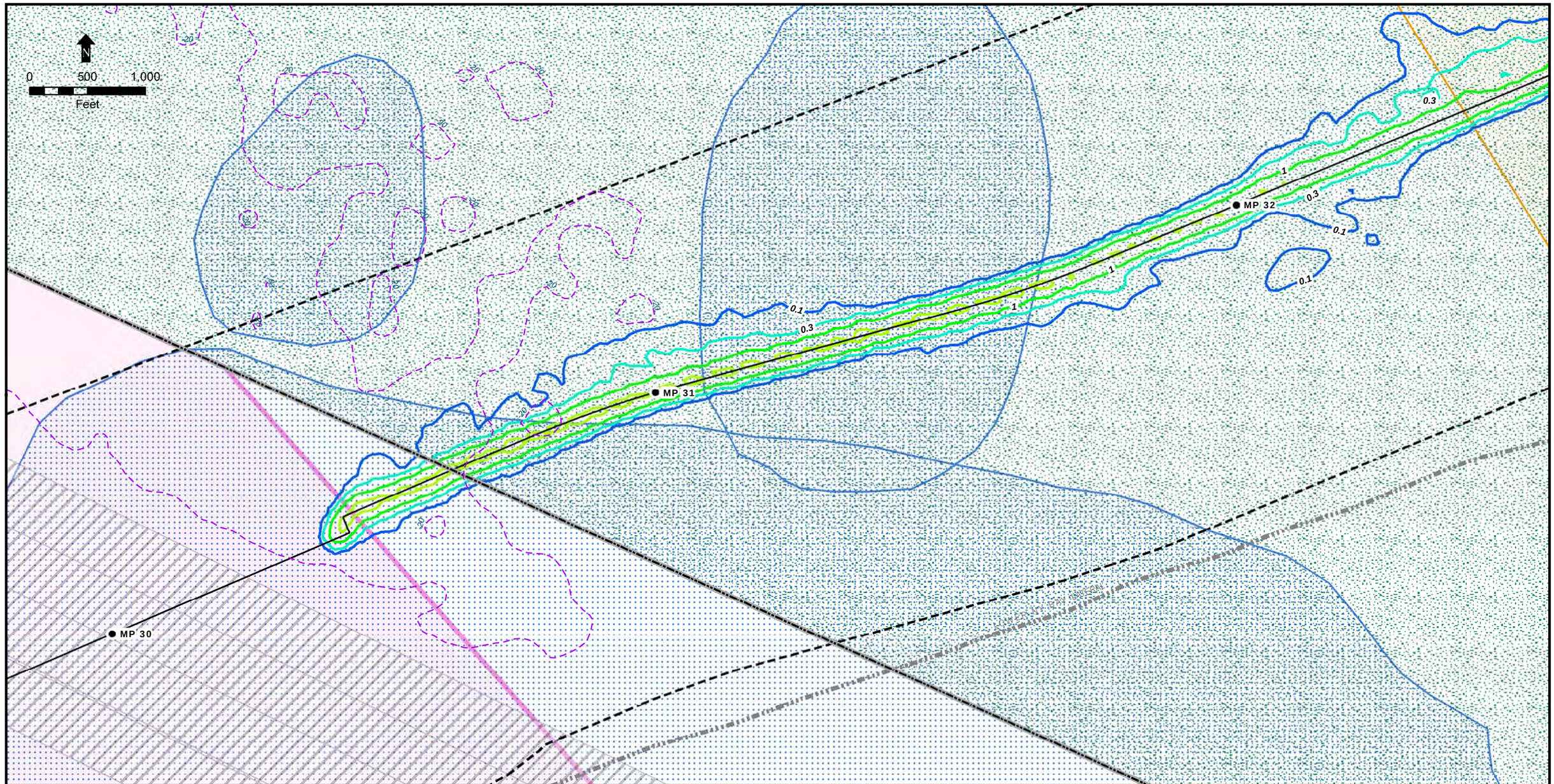
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 25	Page 3 of 3
WO: 1000891		3:13 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 7: JET TRENCHING BETWEEN AMBROSE CHANNEL AND NEPTUNE CROSSING
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

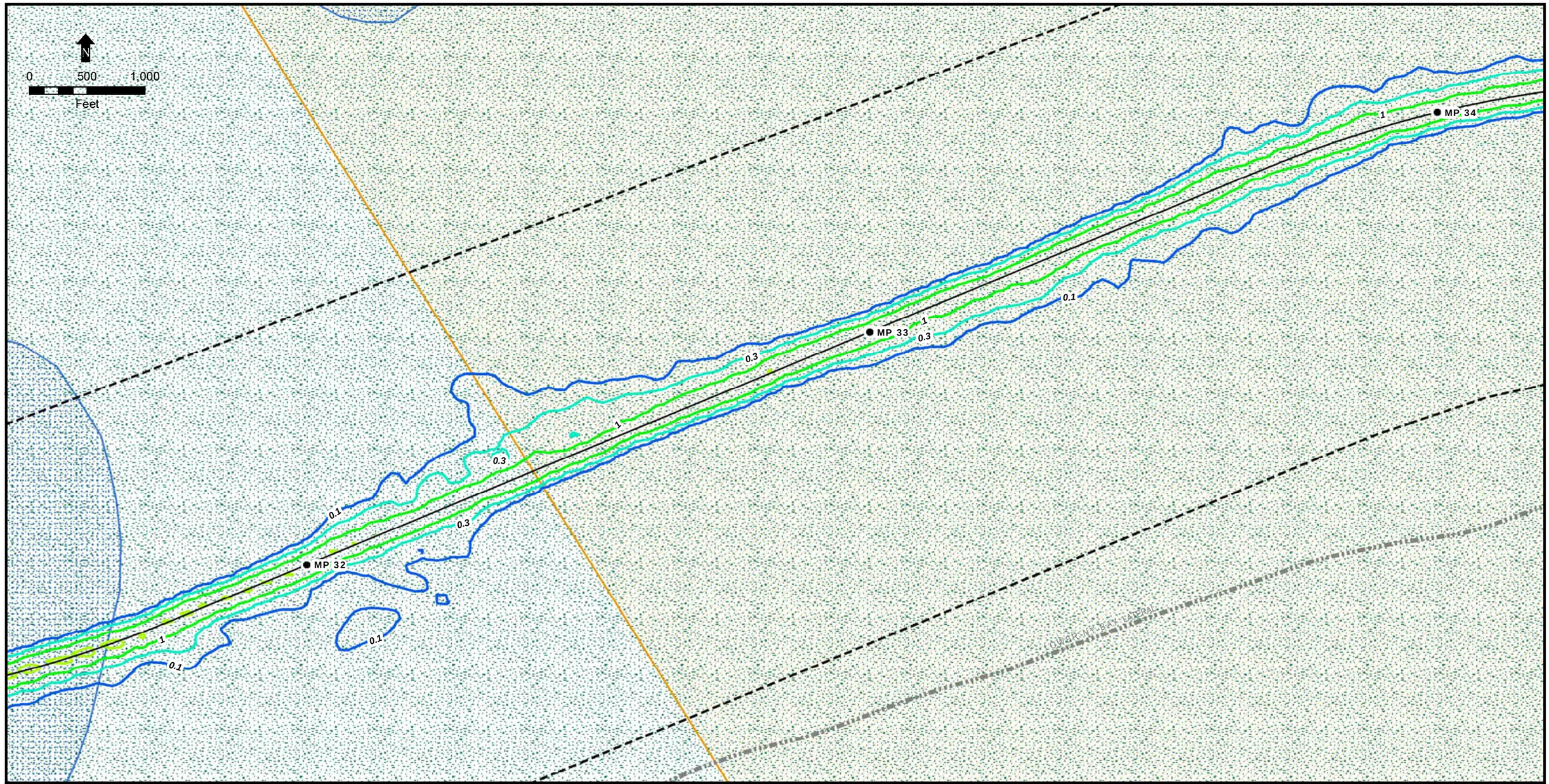
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DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 26	Page 1 of 3
WO: 1000891		3:11 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 7: JET TRENCHING BETWEEN AMBROSE CHANNEL AND NEPTUNE CROSSING
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

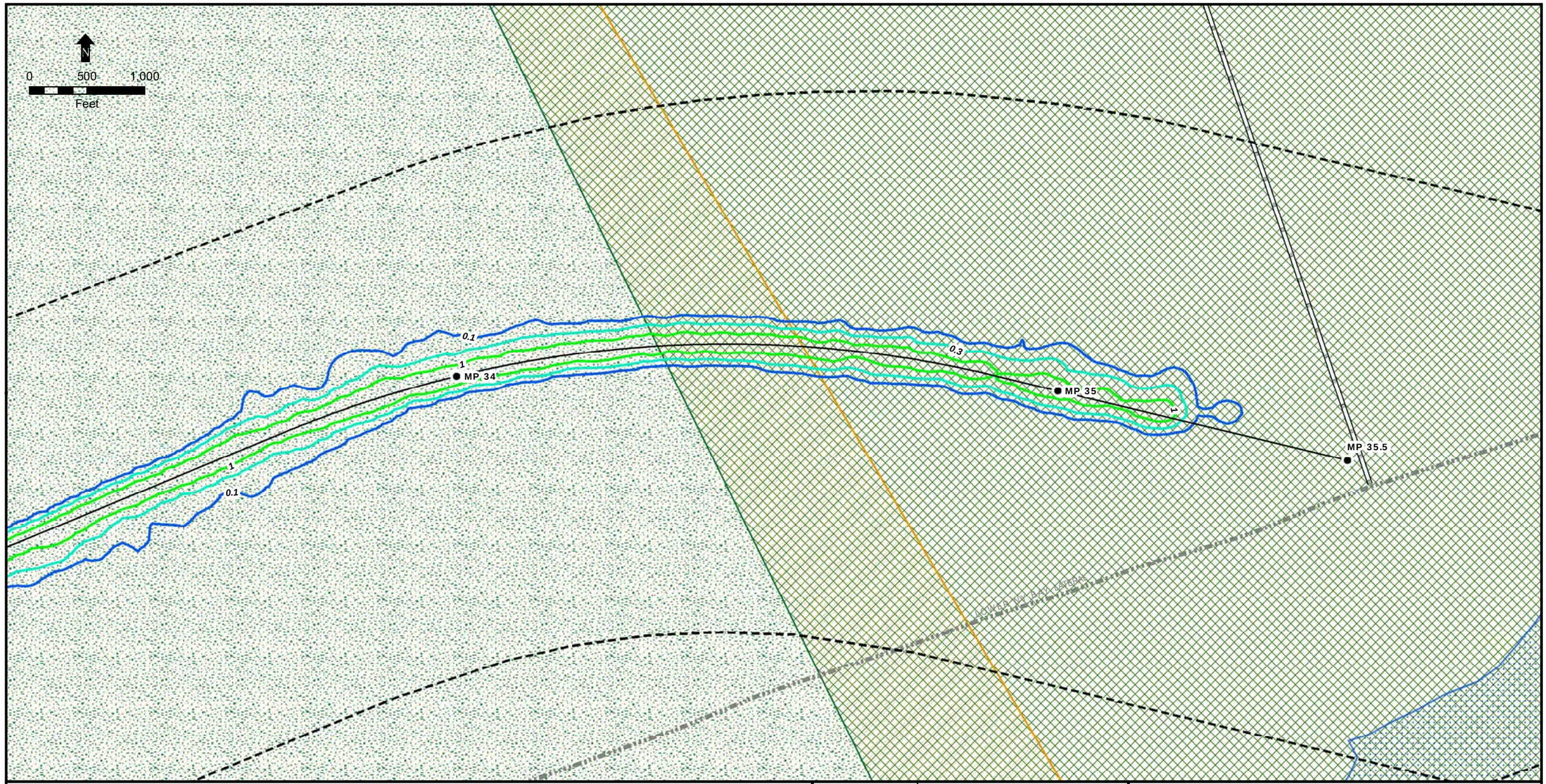
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 27	Page 2 of 3
WO: 1000891		3:13 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NY Shellfish Land - Certified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 7: JET TRENCHING BETWEEN AMBROSE CHANNEL AND NEPTUNE CROSSING
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

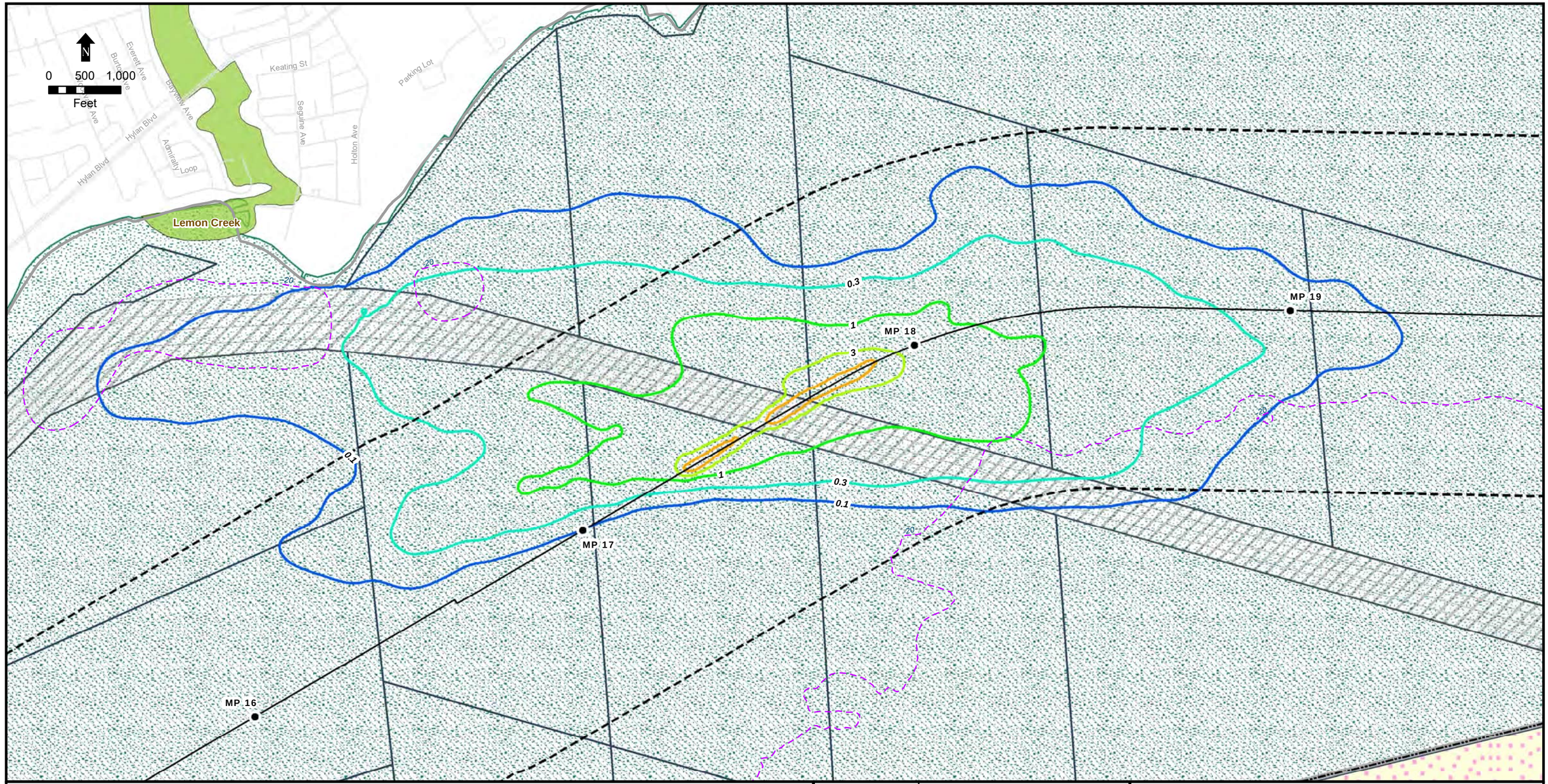
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 28	Page 3 of 3
WO: 1000891		3:14 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NYSDOS Significant Habitats
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Special Restricted Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 8: CLAMSHELL TRENCHING ACROSS THE RARITAN CHANNEL
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

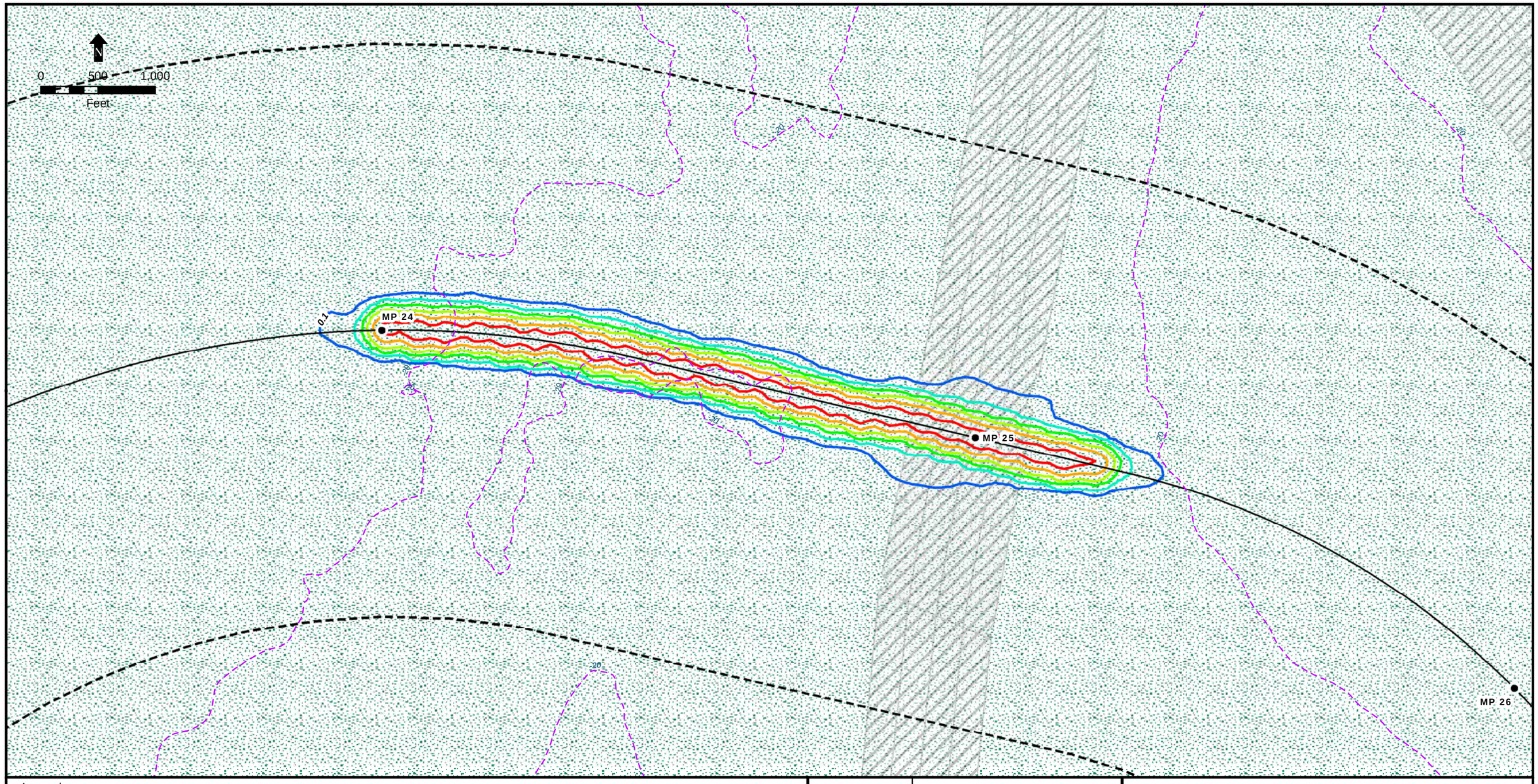
Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 29	SHEET 1 OF 1
WO: 1000891		4:43 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 9: CLAMSHELL TRENCHING BETWEEN THE ANCHORAGE AREA AND CHAPEL HILL CHANNELL
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 30	SHEET 1 OF 1
WO: 1000891		4:46 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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N

0 500 1,000

Feet

MP 28

MP 29

MP 30

LOWER NY BAY LATERAL

0.1

0.3

1

3

10

30

100

300

1000

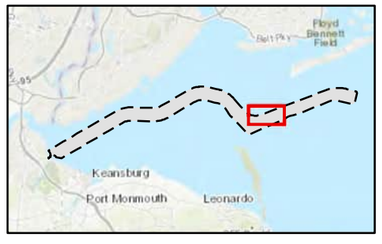
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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 10: EXCAVATION OF AMBROSE CHANNEL
HDD EXIT PIT (WEST)
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

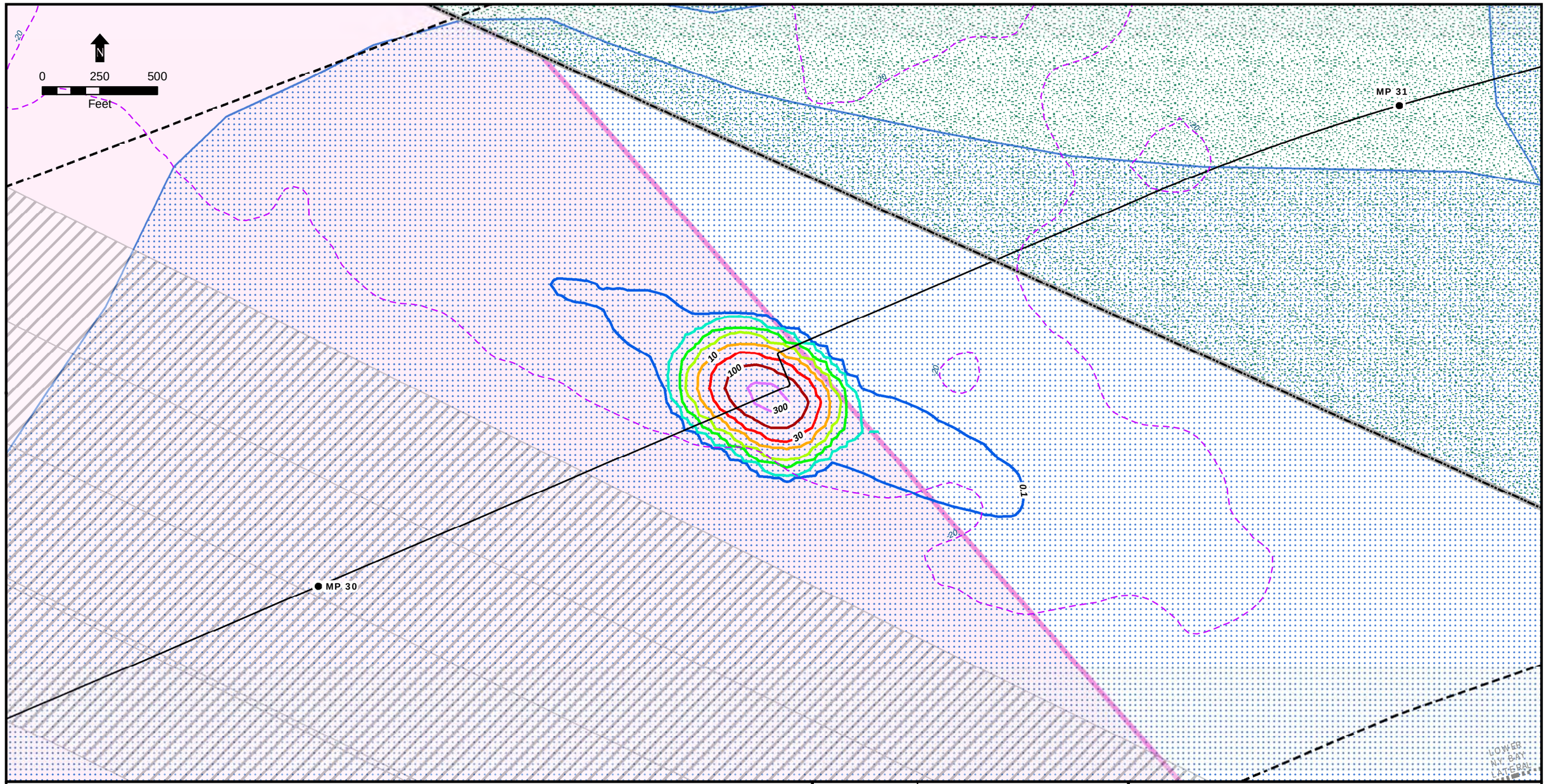
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 31	SHEET 1 OF 1
WO: 1000891		4:49 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- 20' Bathymetric Contour
- Maintained Navigation Channel
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 11: EXCAVATION OF AMBROSE CHANNEL
HDD ENTRY PIT (EAST) AND TIE-IN
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

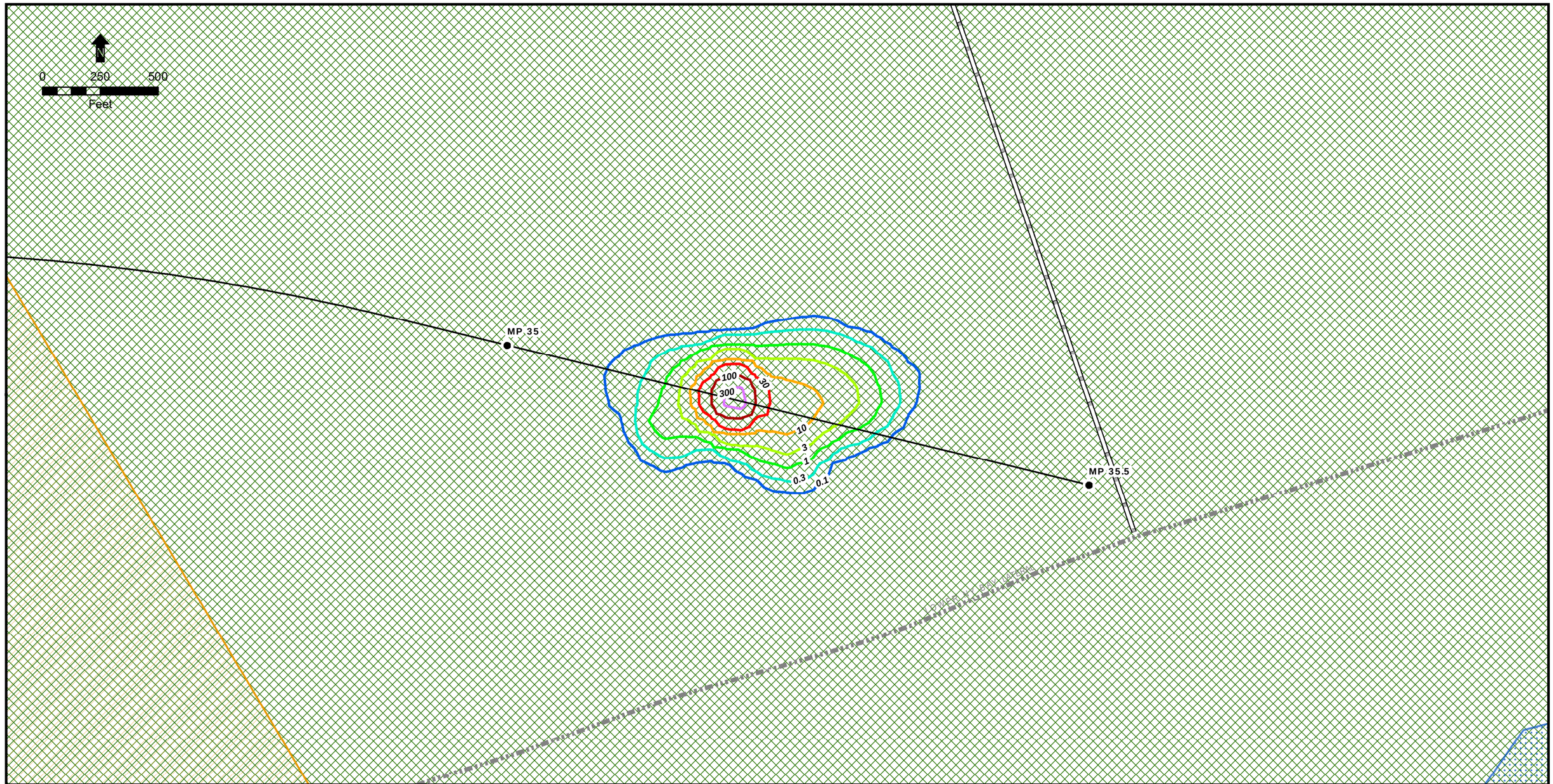
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 32	SHEET 1 OF 1
WO: 1000891		4:51 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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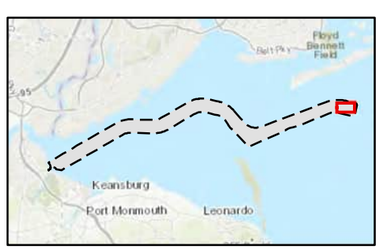


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Certified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SSCENARIO 12: JETTING AT THE NEPTUNE CABLE
CROSSING OFFSHORE ROCKAWAY
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

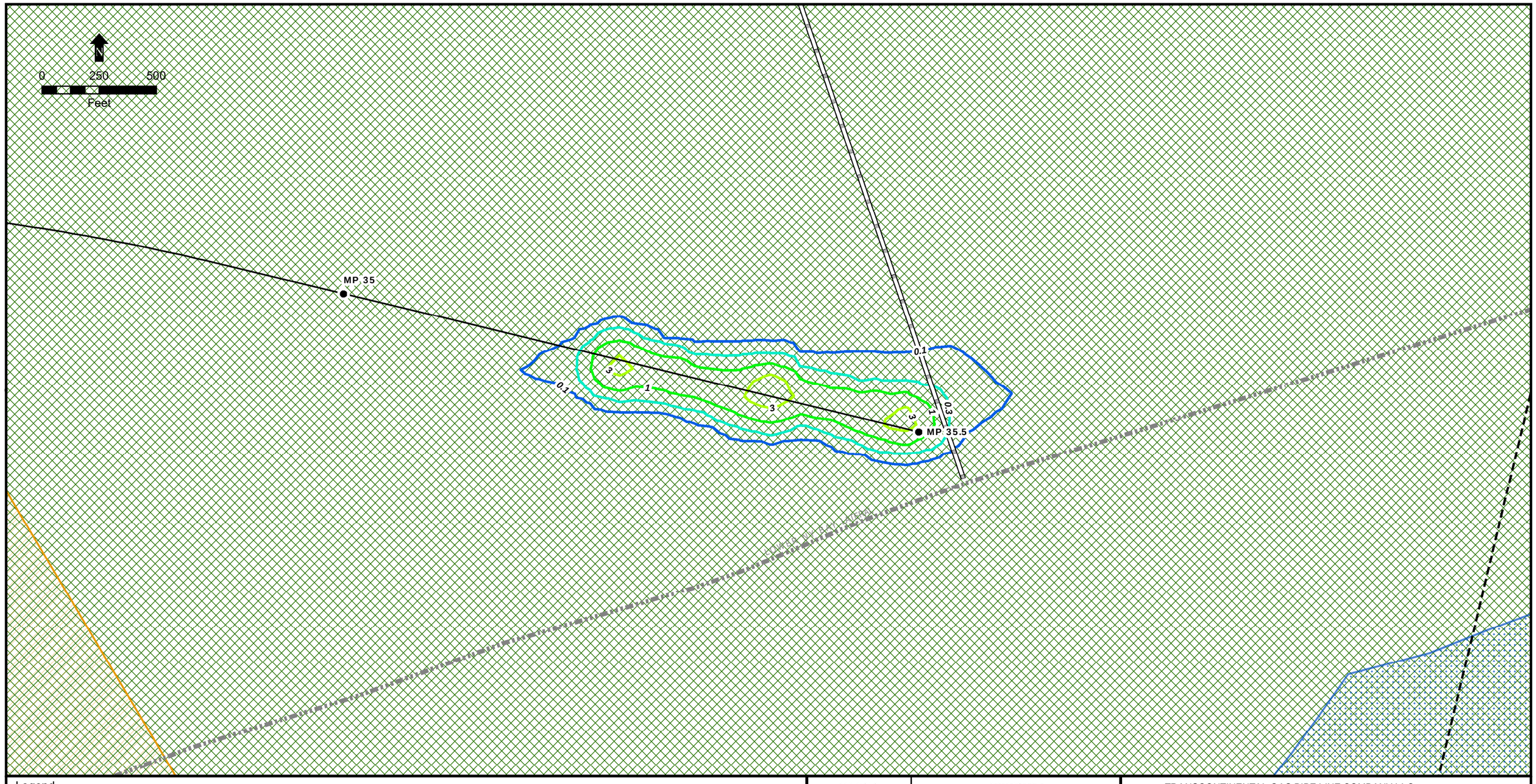
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 33	SHEET 1 OF 1
WO: 1000891		4:52 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Certified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 13: CLAMSHELL TRENCHING BETWEEN THE NEPTUNE CROSSING AND RDL MANIFOLD
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

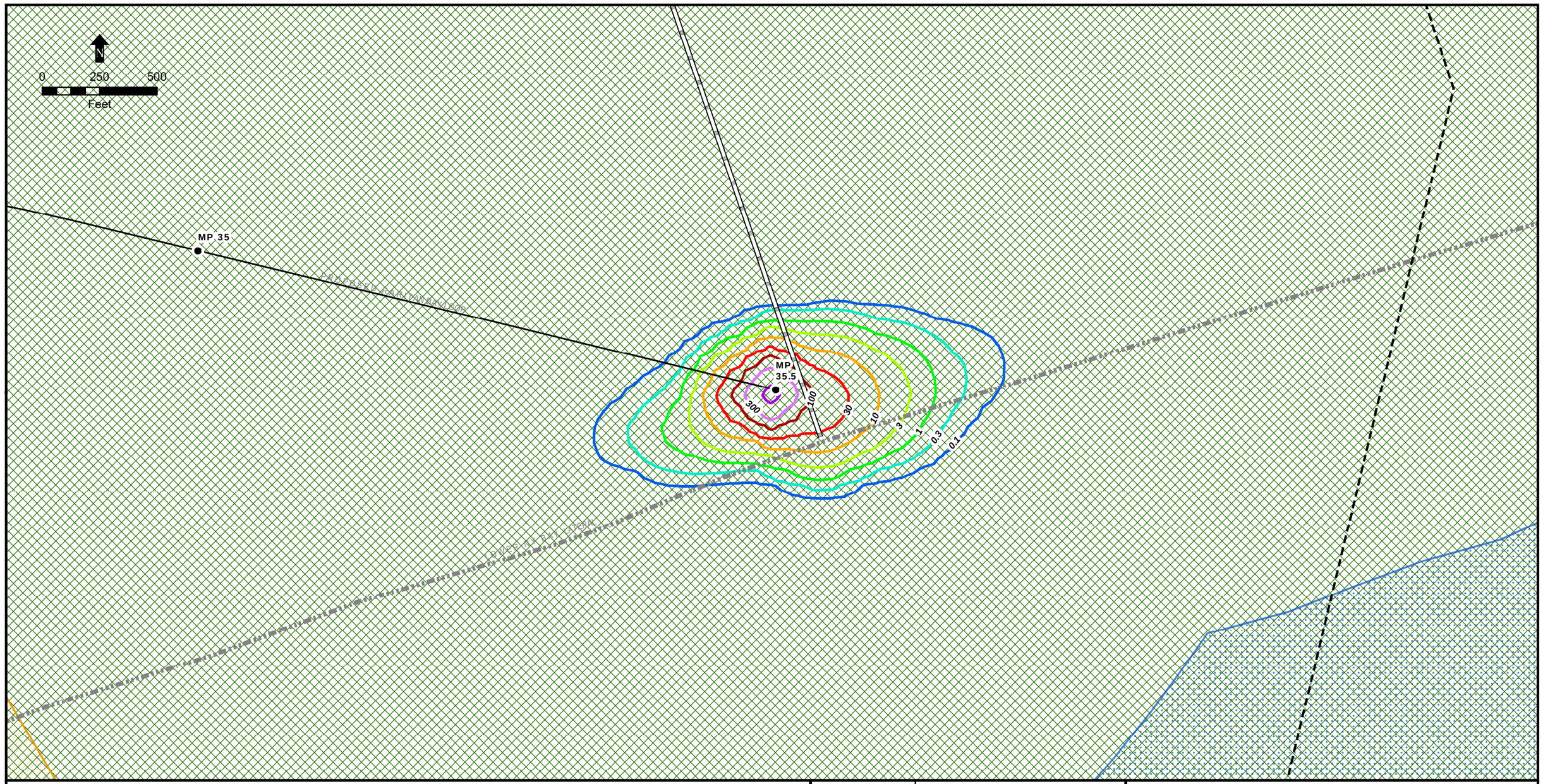
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 34	SHEET 1 OF 1
WO: 1000891		4:52 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Certified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

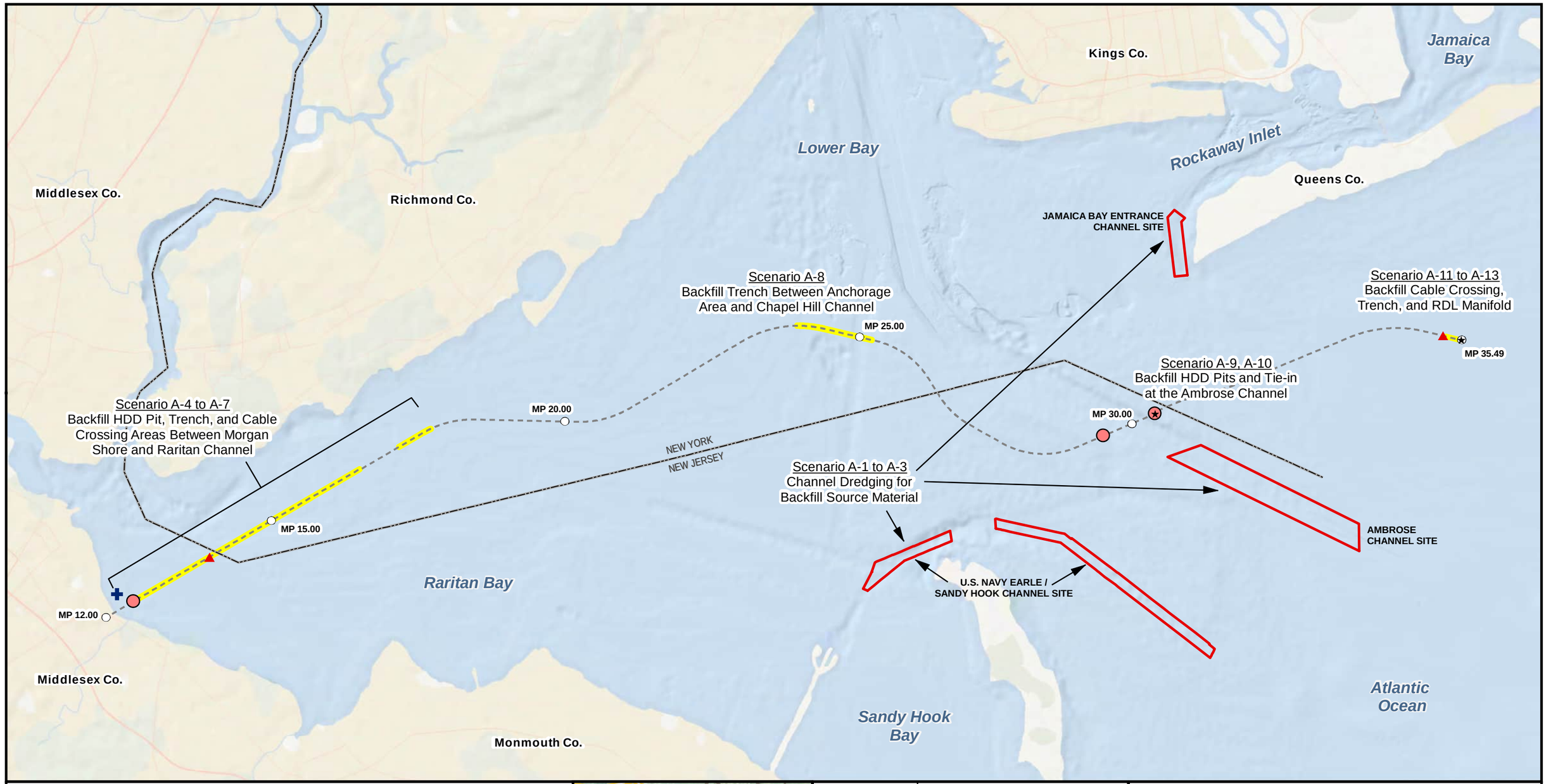
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO 14: EXCAVATION THE TIE-IN SKID
AND MANIFOLD AT ROCKAWAY
COMPLETE DEPOSITION RESULTS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 35	SHEET 1 OF 1
WO: 1000891		4:53 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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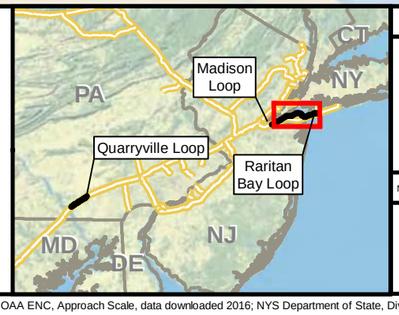
Legend

- HDD Pit
- Anode Sled
- Cable Crossing
- Tie-in Point
- Milepost
- NY/NJ Boundary
- Proposed Raritan Bay Loop
- Pre-Lay (Clamshell) Trenching
- Potential Offshore Backfill Source

N

0 0.5 1

Miles



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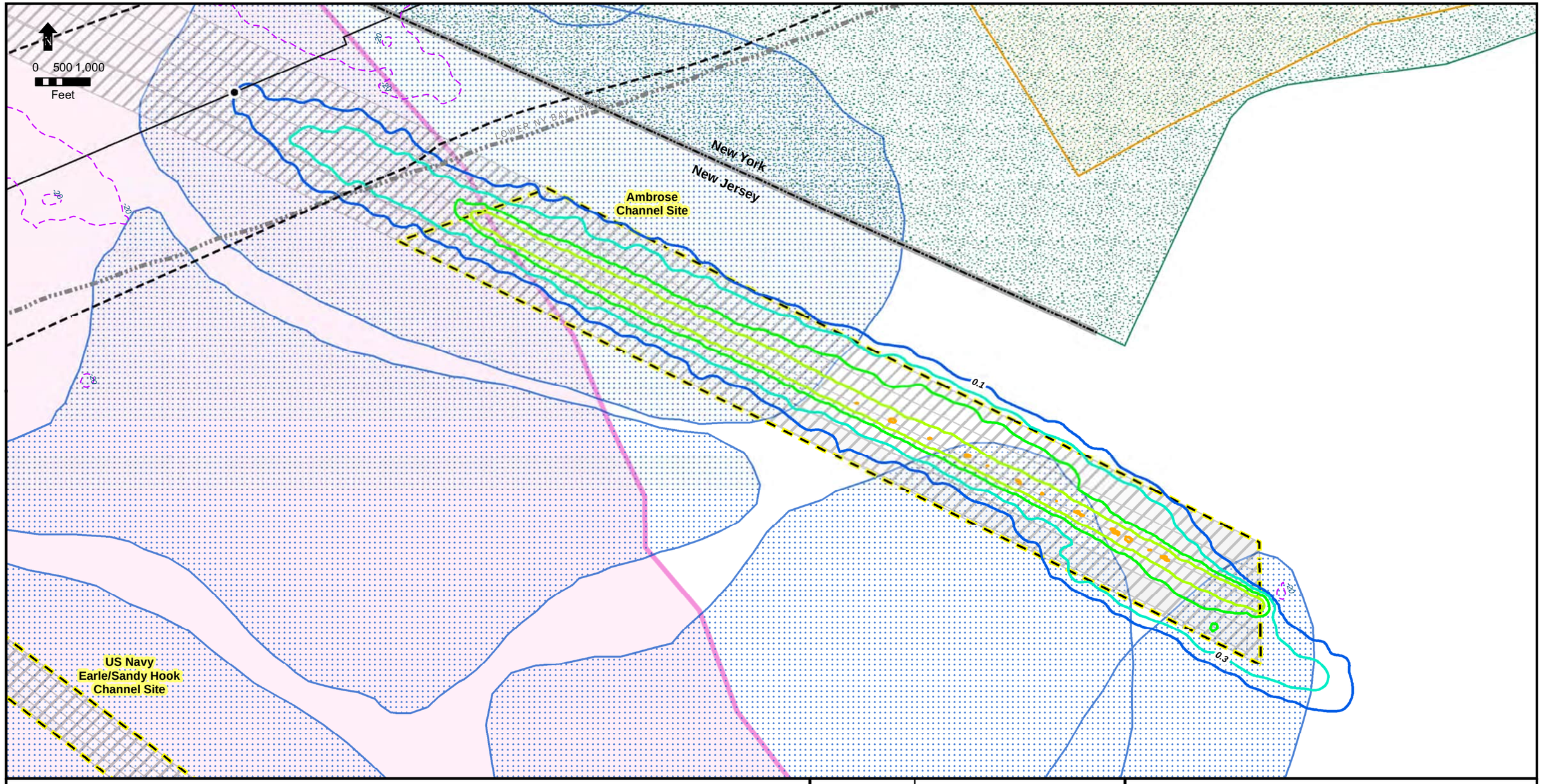
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
INDEX MAP FOR OFFSHORE BACKFILL
SEDIMENT MODELING SCENARIOS
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	MK	ISSUED FOR PERMITTING	1000891	RS	SM

DRAWN BY: MK	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: RS	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 36	SHEET 1 OF 1
WO: 1000891		4:52 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

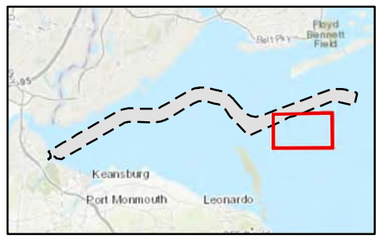
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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A1
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

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APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 37	Page 1 of 1
WO: 1000891		1:23 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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N

0 500 1,000

Feet

Jamaica Bay Entrance Channel Site

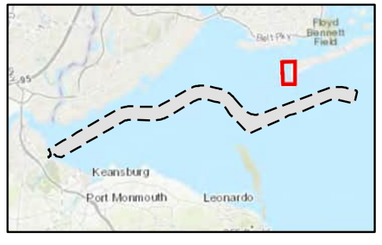
Breezy Point

Rockaway Point Blvd
Alley
Utica Walk
Tioga Walk
Beach 216Th St
Alley
Beach 215Th St
8Th Ave
Beach 207Th St
Oceanside Ave
Alley
Alley
Bedford Ave
Reid Ave
Beach 201St St
Breezy Point Blvd
4Th Ave
Beach 222Nd St
Beach 221St St
4Th Ave
Beach 220Th St
Beach 219Th St

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Potential Offshore Backfill Source
- NYSDOS Significant Habitats

- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- Rockaway Inlet Channel



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A2
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

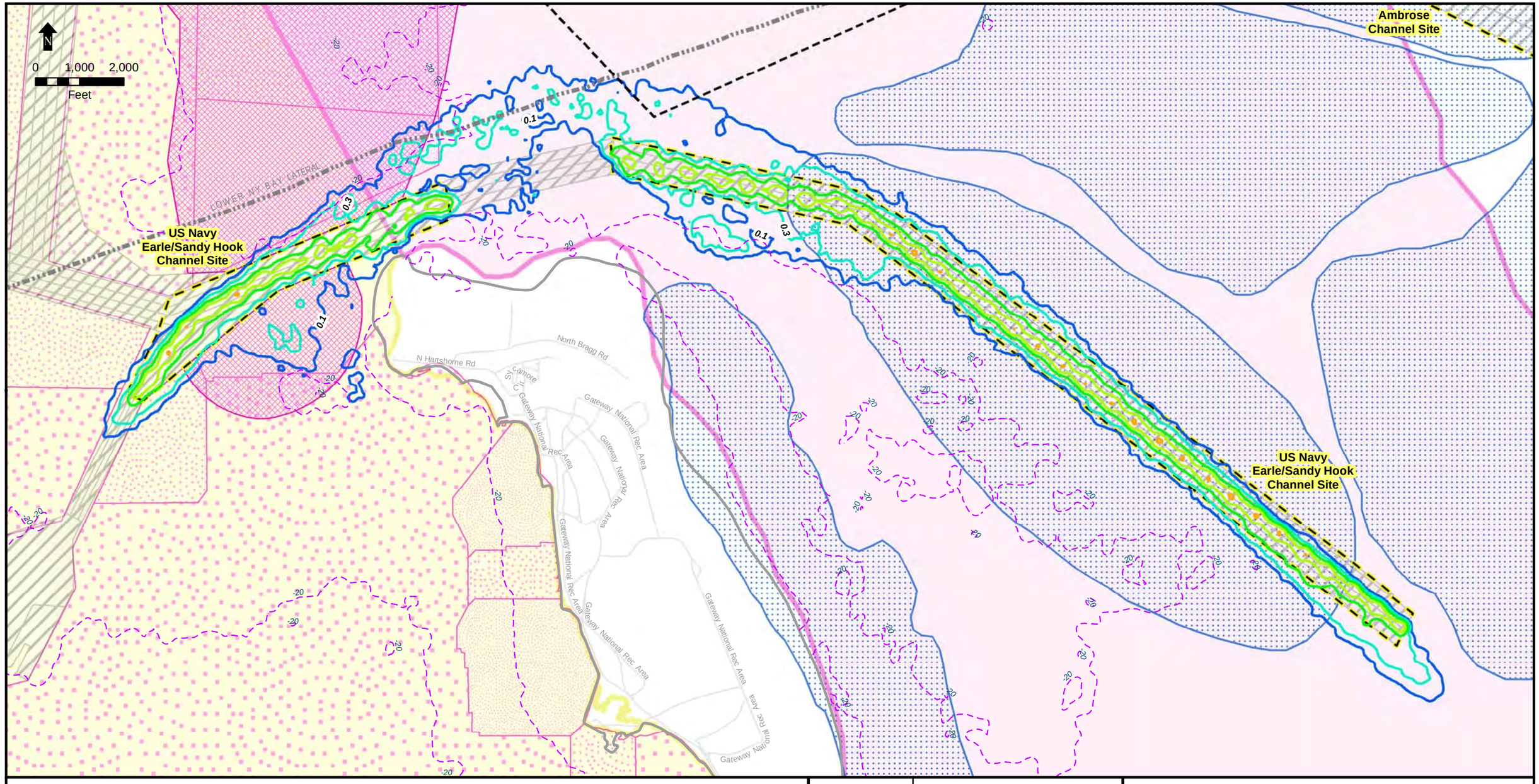
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	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	
WO: 1000891		1:24 PM 6/1/2018	FIGURE 38

Page 1 of 1

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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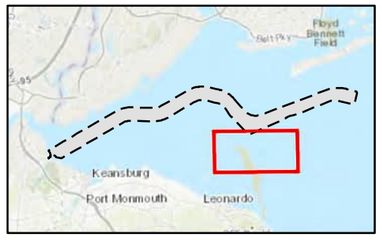
Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water
- Prohibited Harvest Area
- Special Restricted Harvest Area
- NJ DEP Surf Clam Relative Abundance (2014)

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate
- Low



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A3
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

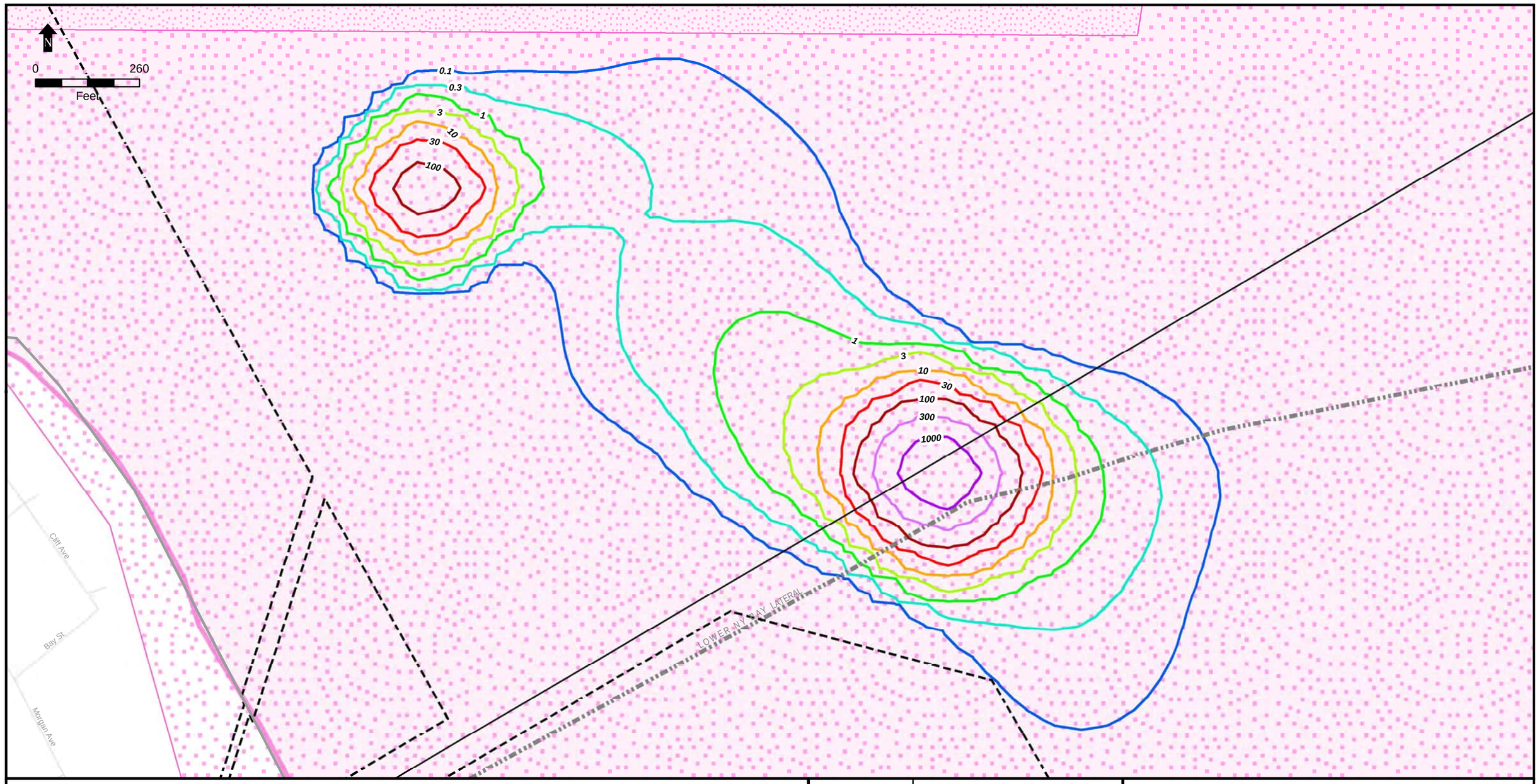
Williams

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 39	Page 1 of 1
WO: 1000891		1:26 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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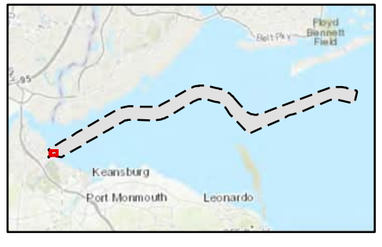


Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Potential Offshore Backfill Source

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A4
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

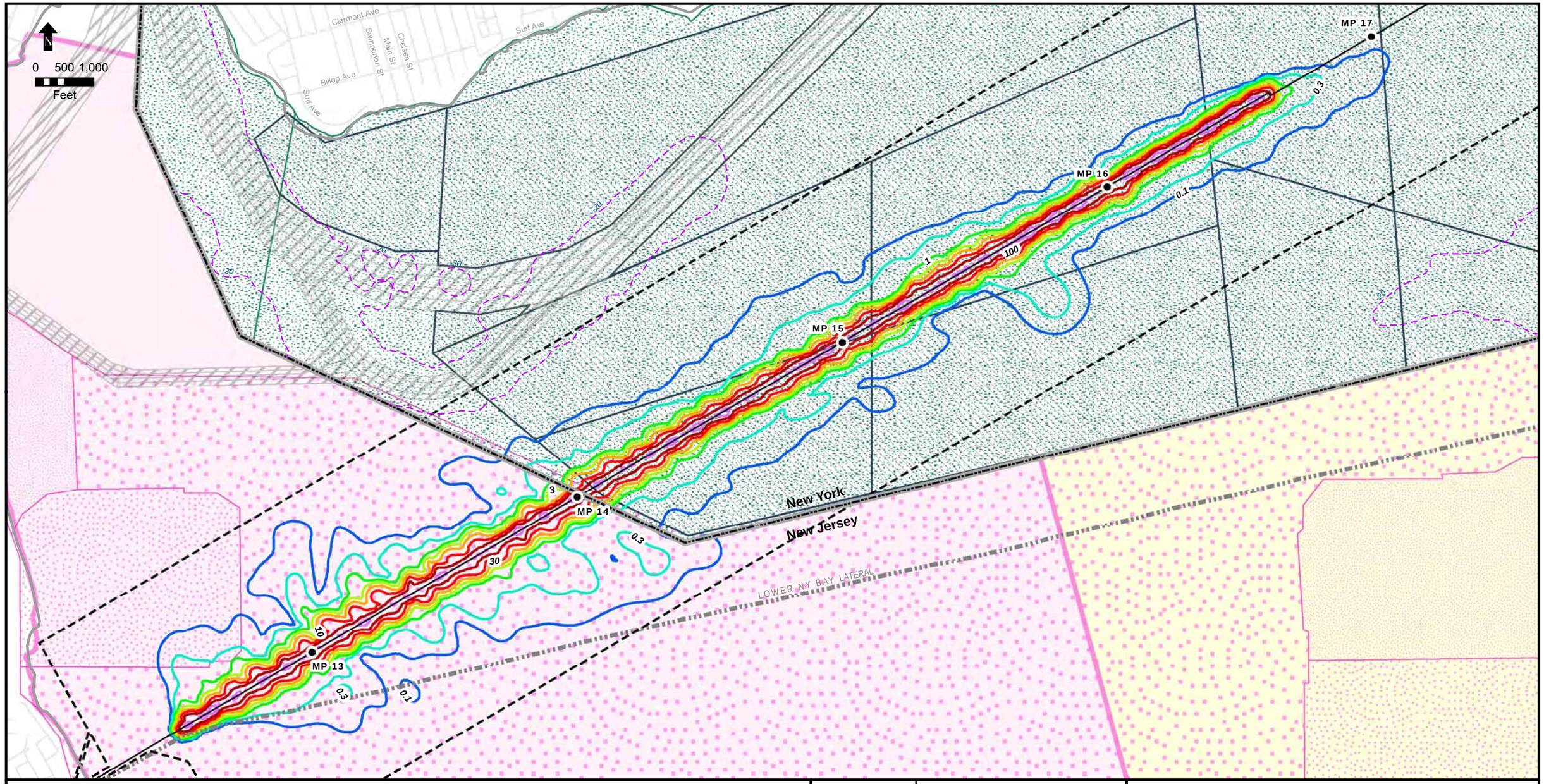
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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 40	Page 1 of 1
WO: 1000891		1:27 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water
- Prohibited Harvest Area
- Special Restricted Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate
- Low



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A5
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

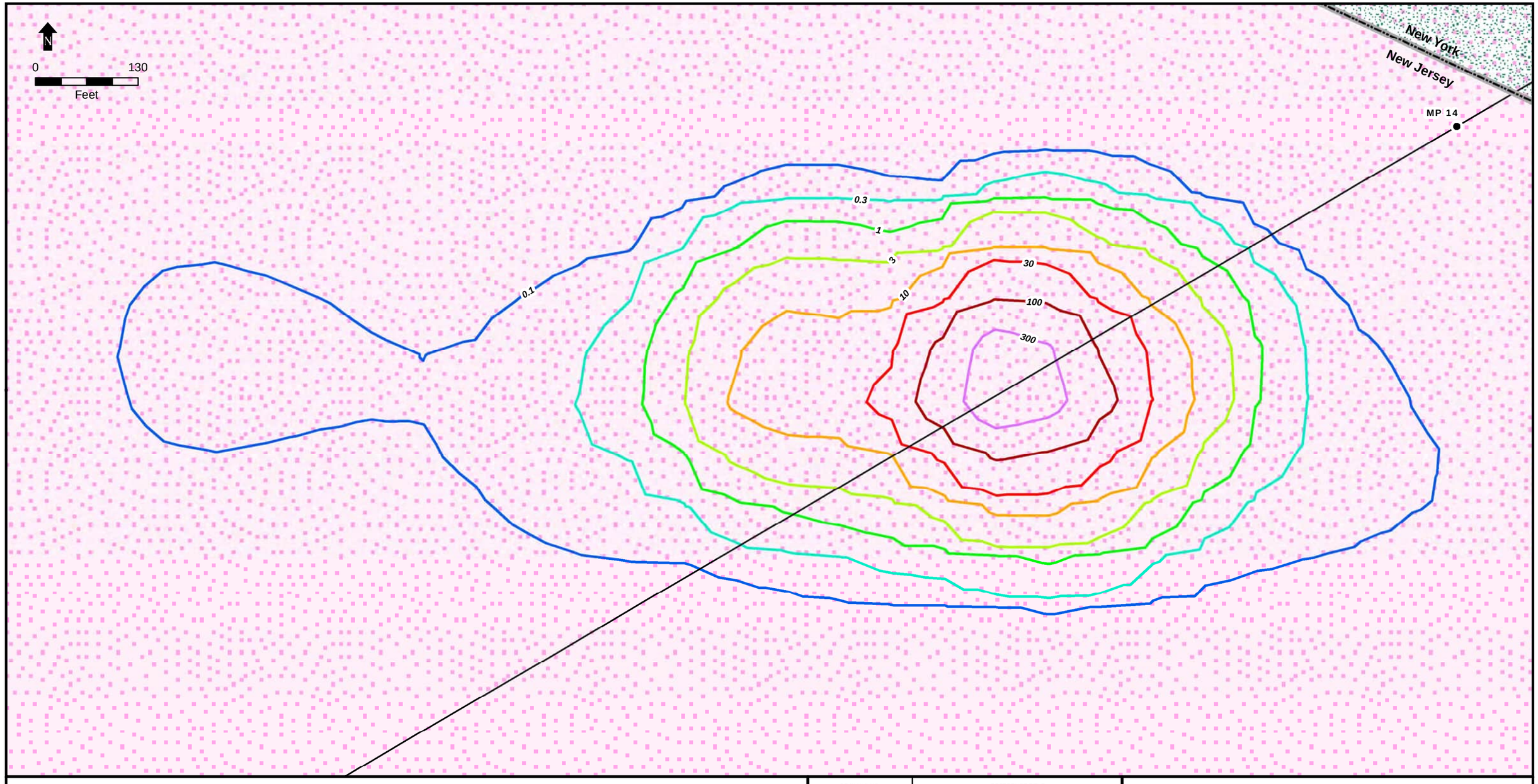
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	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 41	Page 1 of 1
WO: 1000891		1:28 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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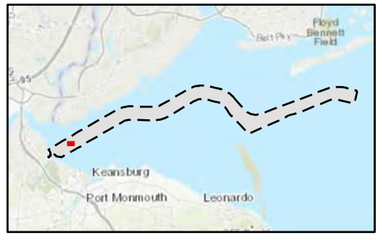


Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Potential Offshore Backfill Source
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A6
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

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	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS DATE: 6/1/2018
CHECKED BY: MK DATE: 6/1/2018
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ISSUE FOR BID: N/A
ISSUE FOR CONSTRUCTION: N/A

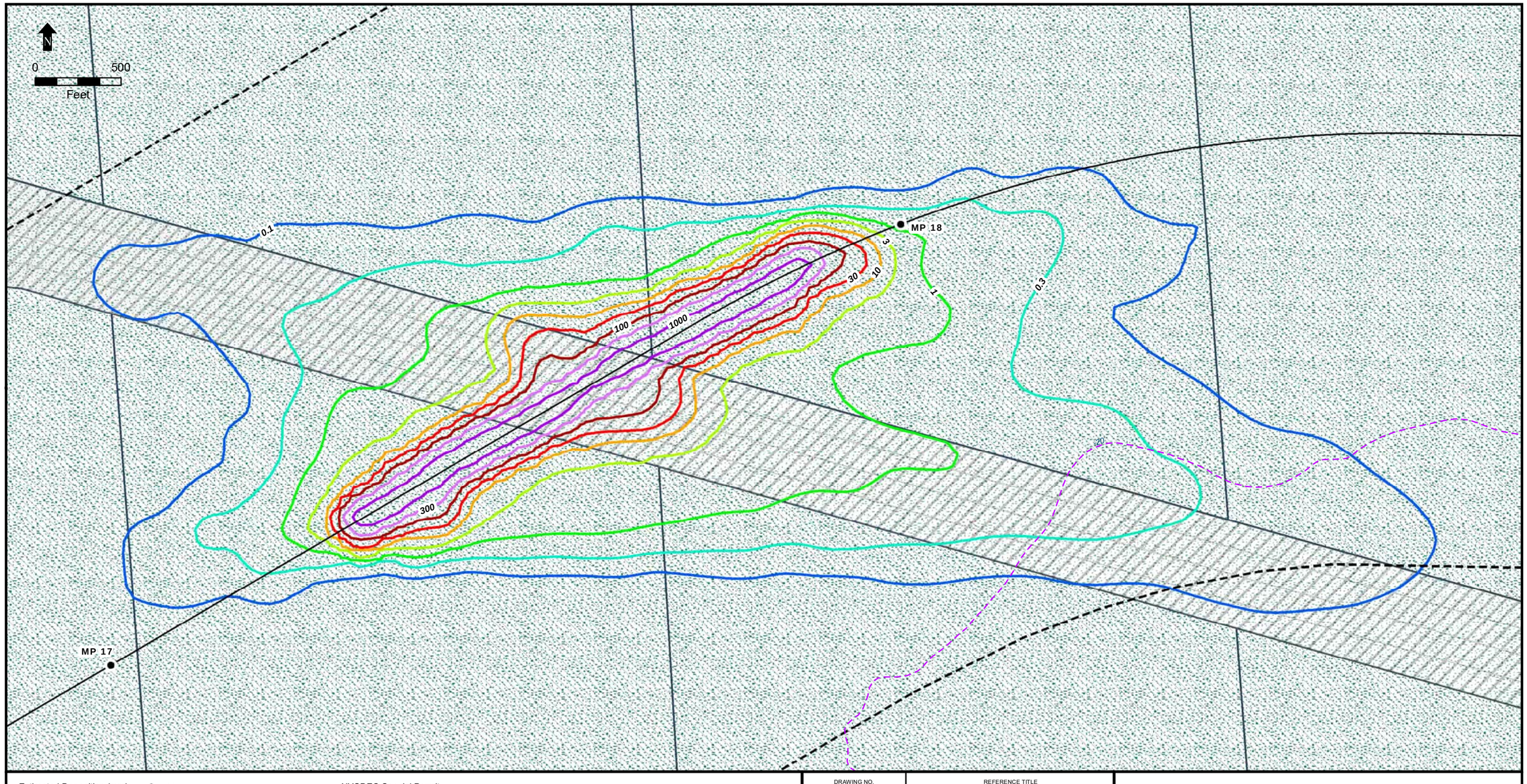
Project features ver20

DRAWING NUMBER: FIGURE 42

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Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A7
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

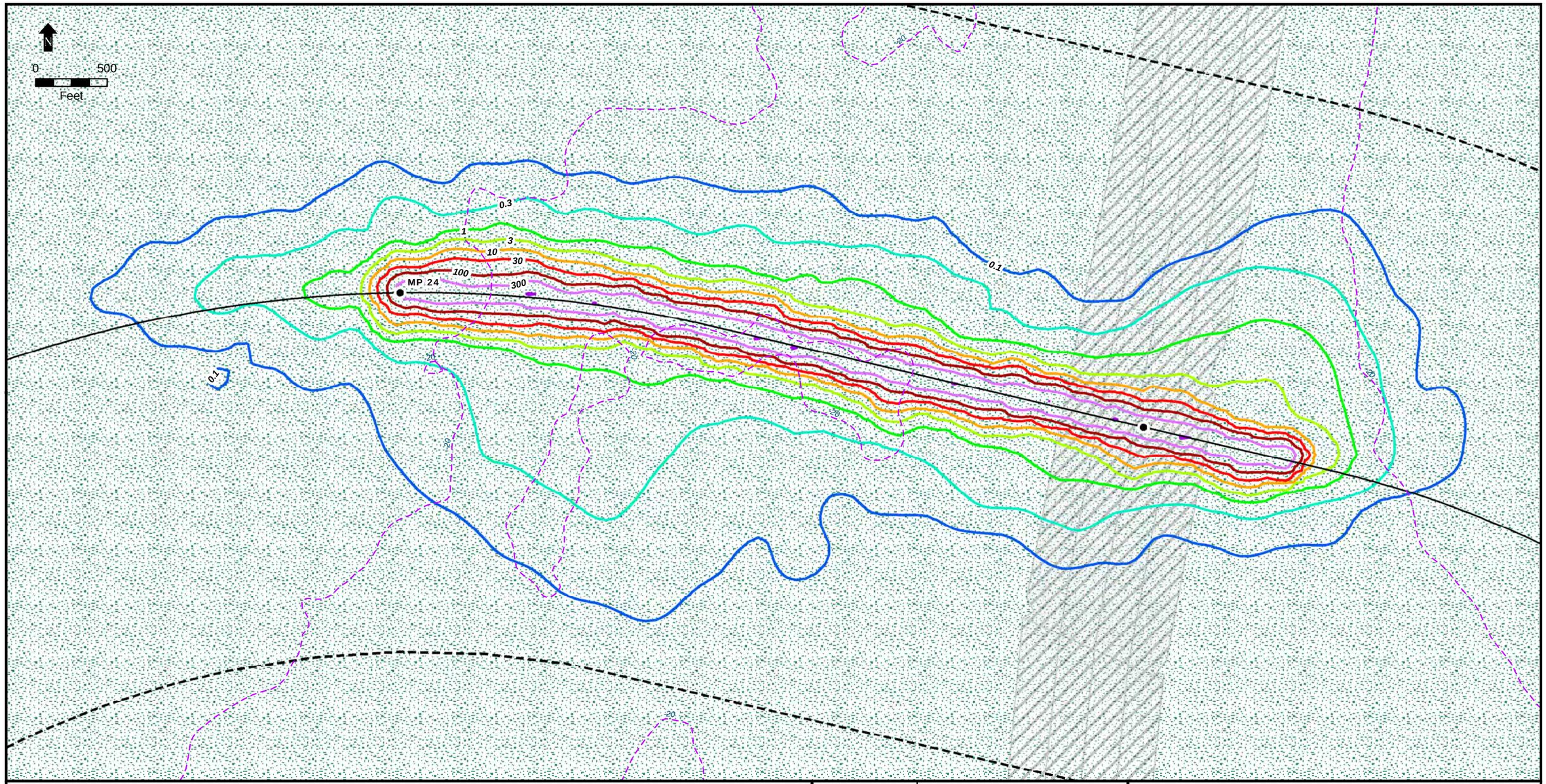
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 43	Page 1 of 1
WO: 1000891		1:30 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source
- NY Shellfish Land - Uncertified



DRAWING NO.	REFERENCE TITLE

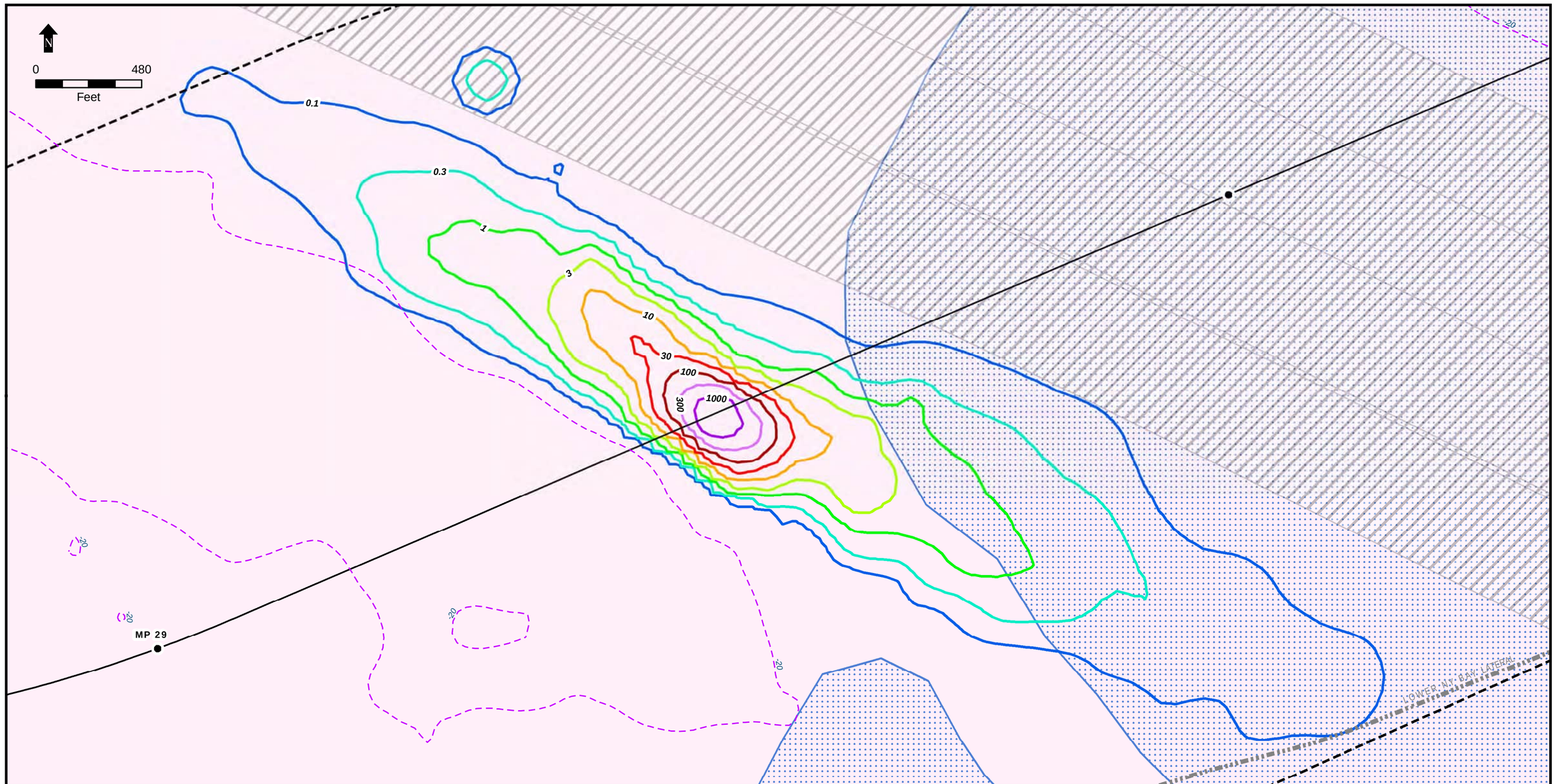
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A8
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 44	Page 1 of 1
WO: 1000891		1:31 PM 6/1/2018	

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NJDEP Sport Ocean Fishing Grounds
- NJ Shellfish Growing Water
- Prohibited Harvest Area



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A9
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

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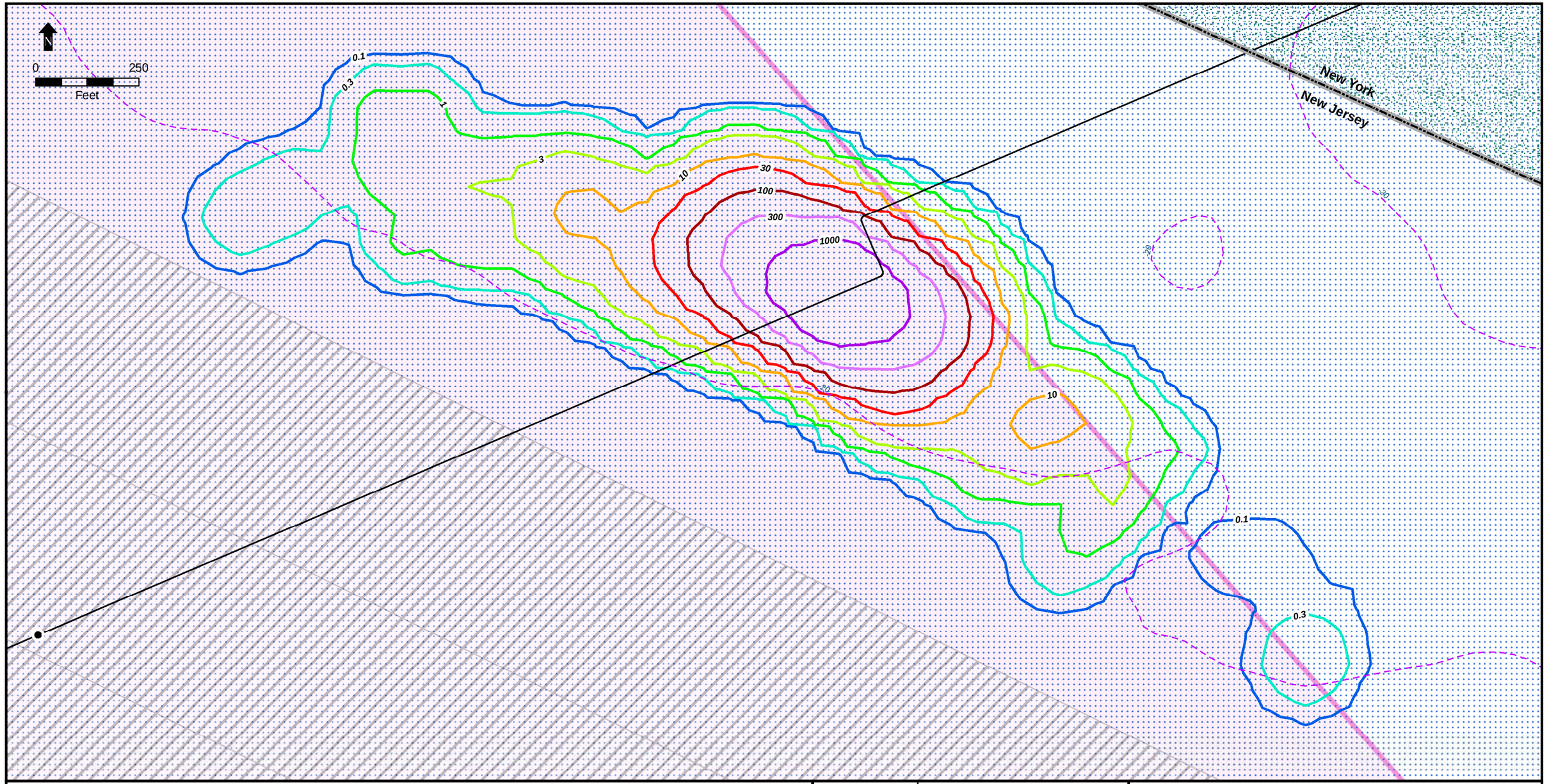
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	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	
WO: 1000891		1:33 PM 6/1/2018	FIGURE 45

Page 1 of 1

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

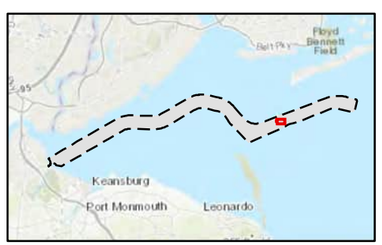
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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- 20' Bathymetric Contour
- Temporary Workspace
- Maintained Navigation Channel
- Potential Offshore Backfill Source

- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area



DRAWING NO.	REFERENCE TITLE

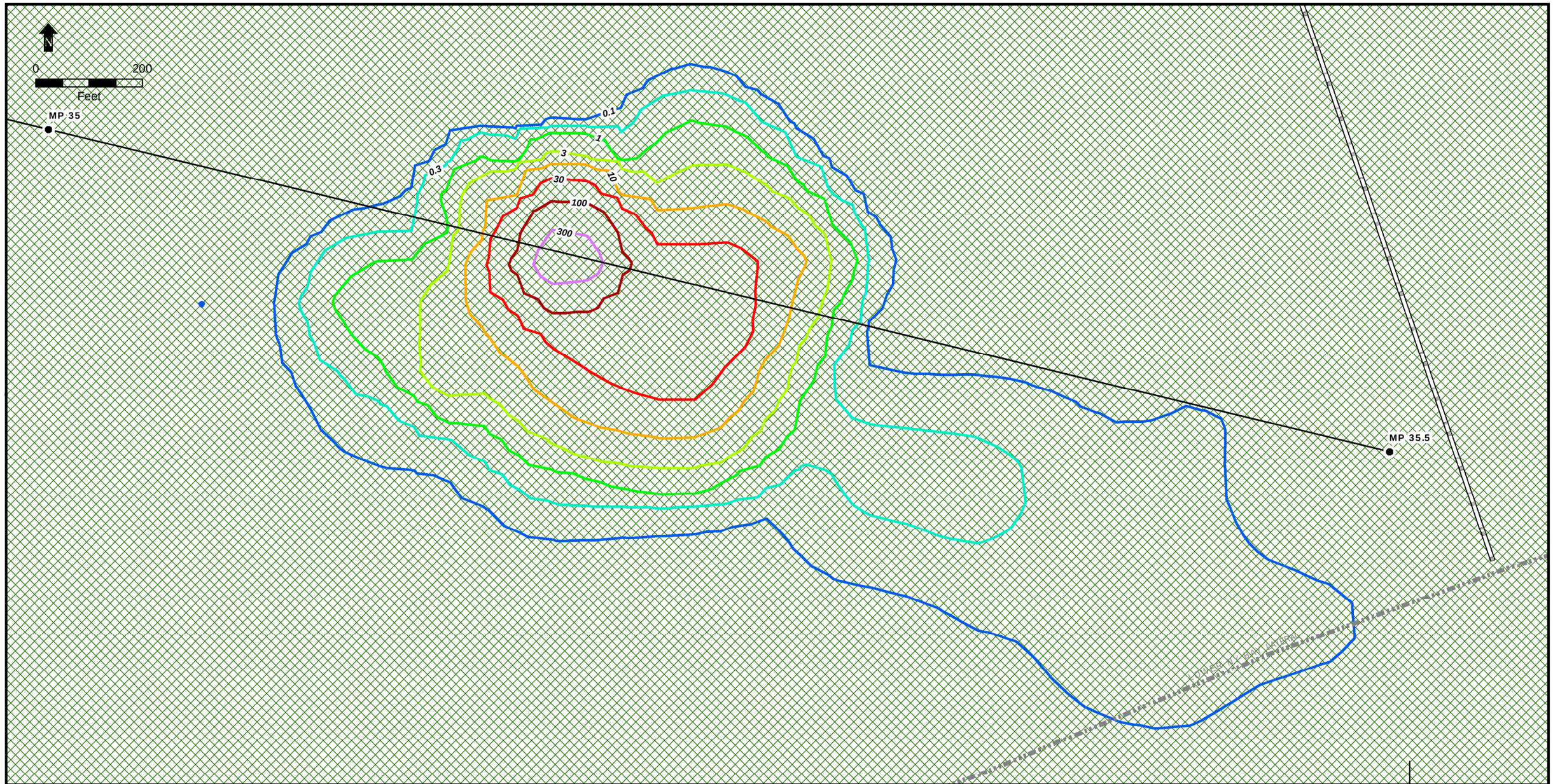
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BACKFILL-RELATED SCENARIO A10
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
	6/1/2018	RS	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 46
WO: 1000891		1:34 PM 6/1/2018	Page 1 of 1

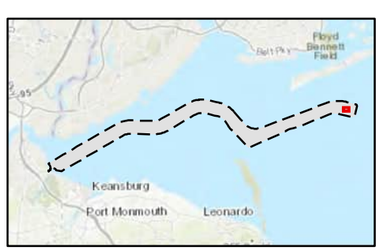
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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Potential Offshore Backfill Source
- NY Shellfish Land - Certified



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A11
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

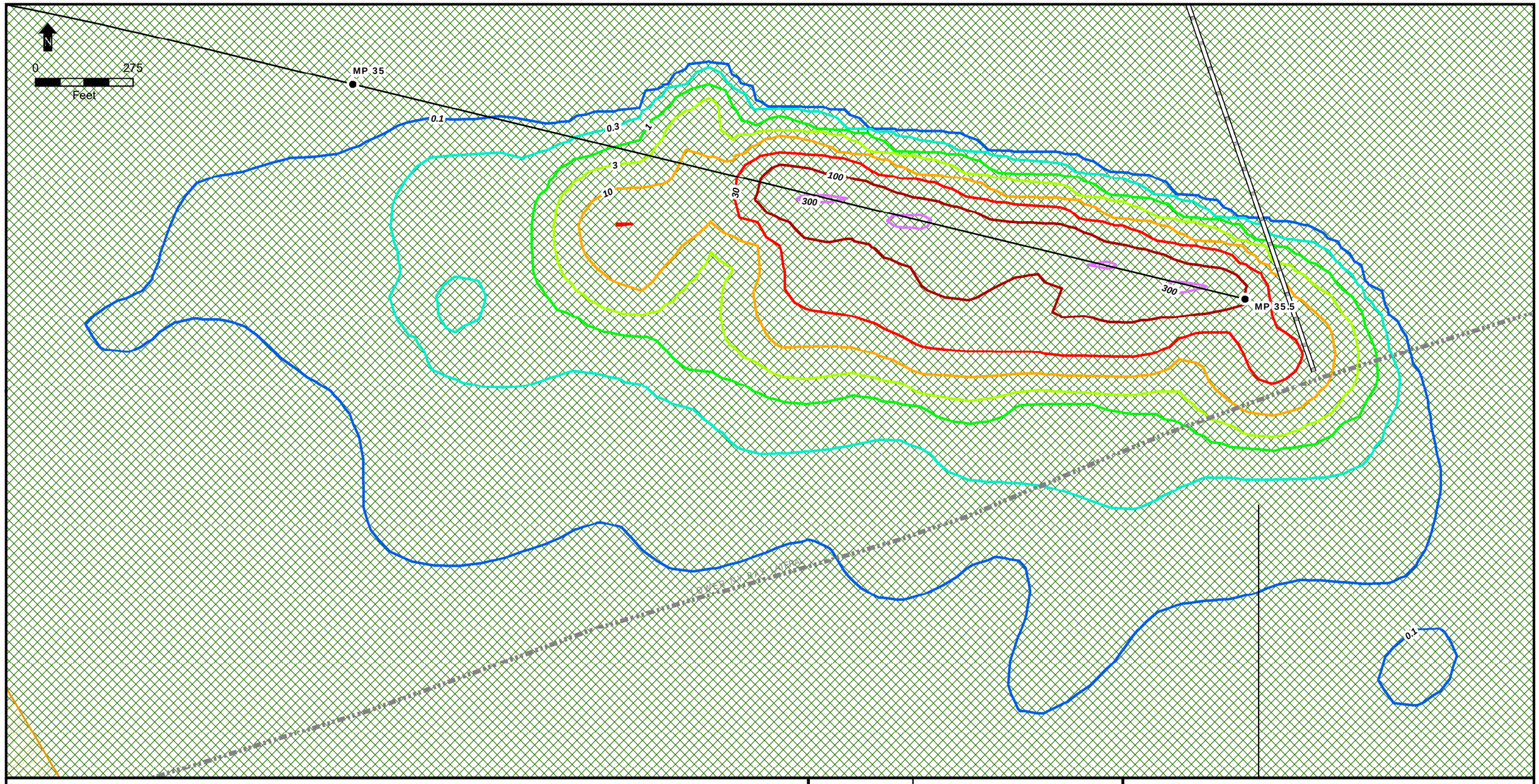
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DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 46
WO: 1000891		1:35 PM 6/1/2018	Page 1 of 1

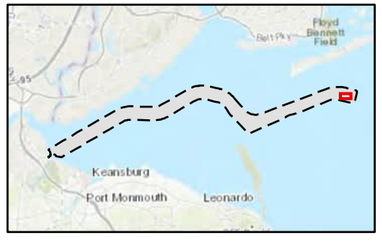
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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Potential Offshore Backfill Source
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Certified



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A12
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

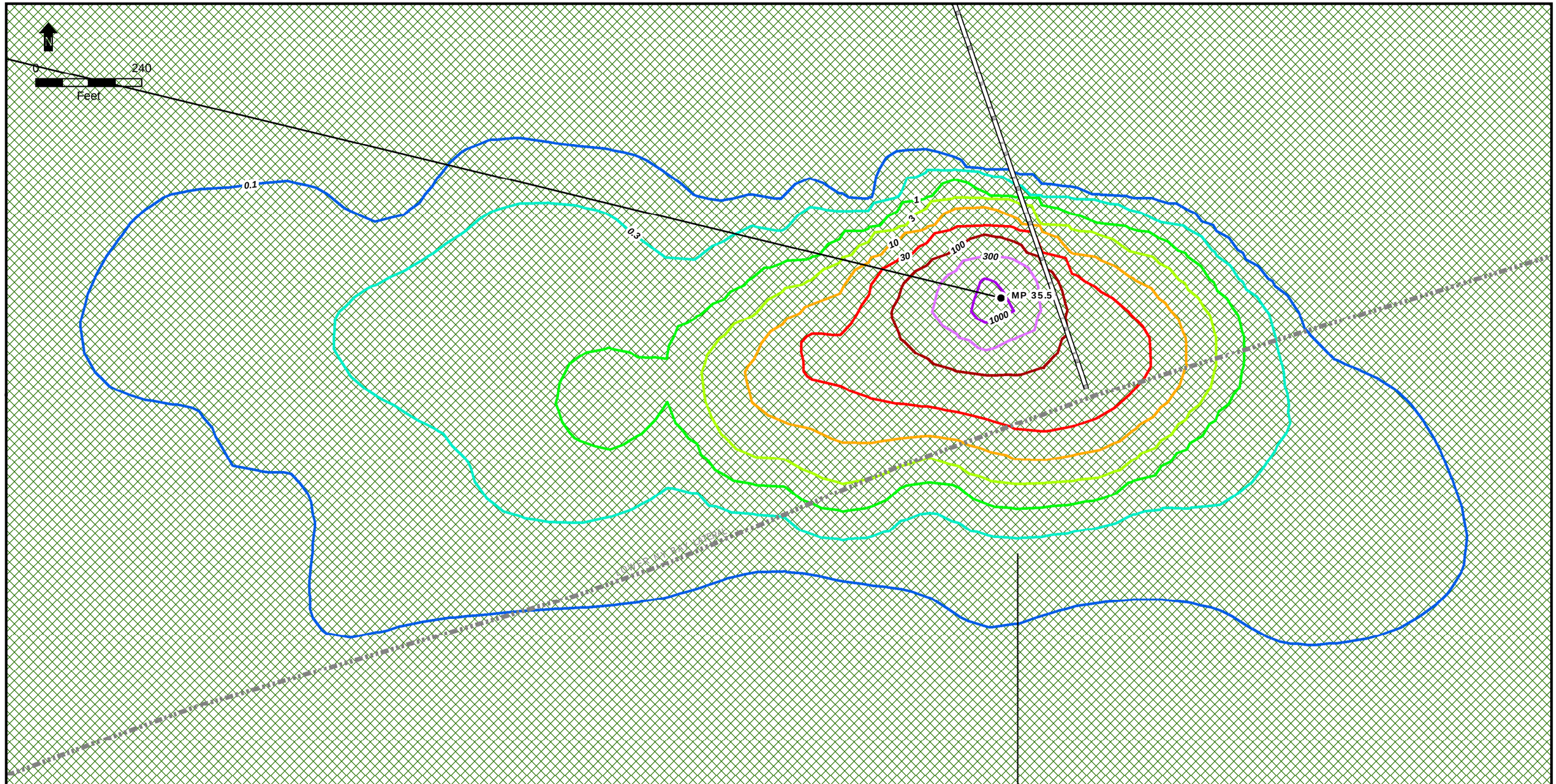
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CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 48	Page 1 of 1
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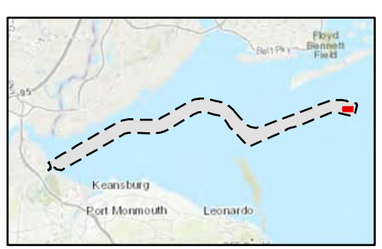
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Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Temporary Workspace
- Potential Offshore Backfill Source
- NY Shellfish Land - Certified



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
BACKFILL-RELATED SCENARIO A13
AREAS OF POTENTIAL RESOURCE EFFECTS FROM DEPOSITION
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

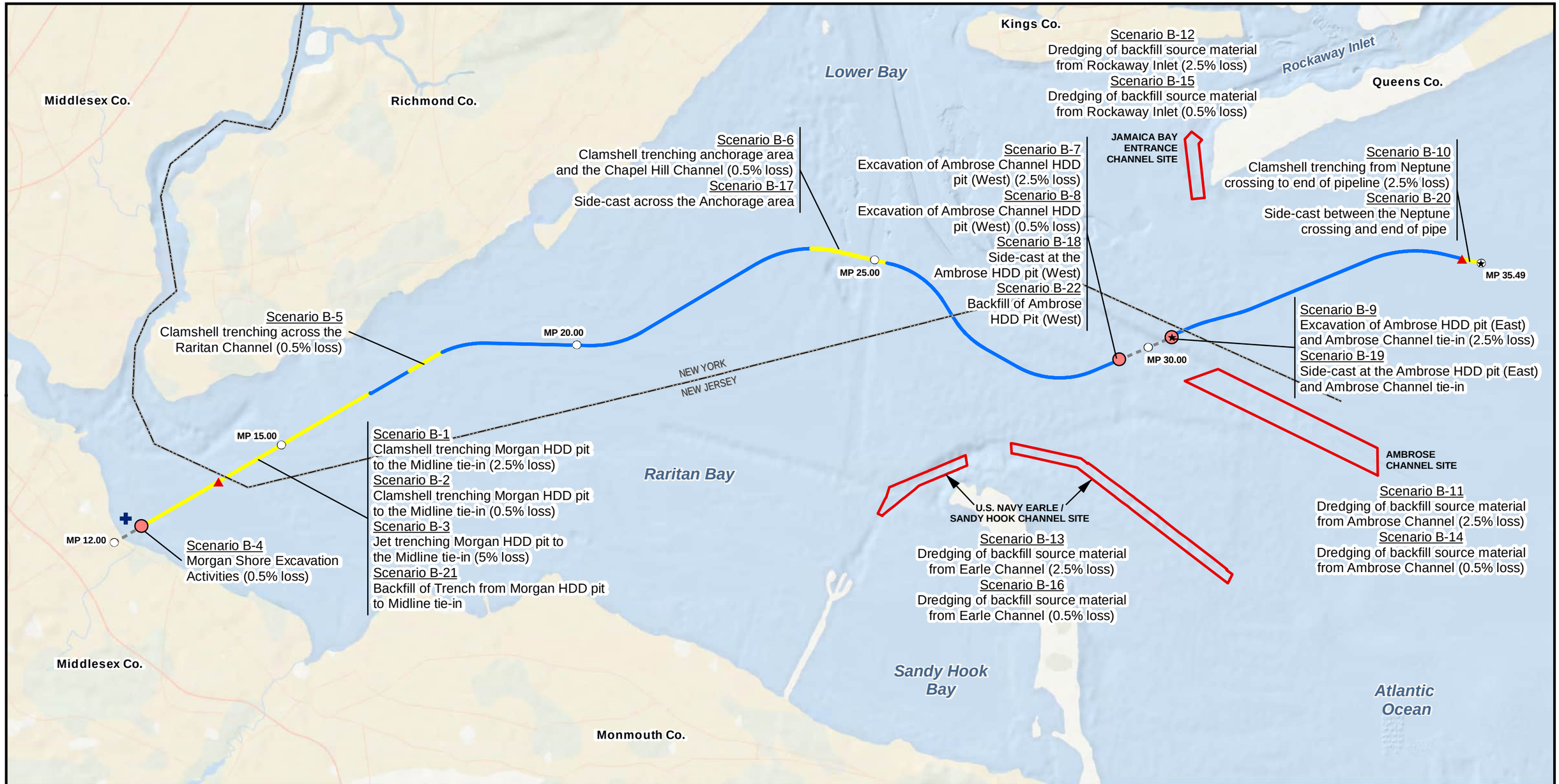
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DRAWN BY: RS	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	FIGURE 49
WO: 1000891		1:37 PM 6/1/2018	Page 1 of 1

Data Sources: Williams 2017; E&E 2017; ESRI 2012, 2017; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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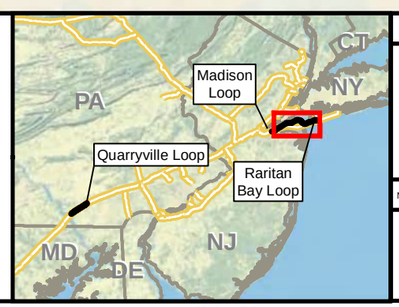
Legend

- HDD Pit
- Anode Sled Excavation
- Cable Crossing
- Tie-in Point
- Milepost
- NY/NJ Boundary
- Potential Offshore Backfill Source
- Proposed Raritan Bay Loop
- Post-Lay (Jet) Trenching
- Pre-Lay (Clamshell) Trenching
- Horizontal Directional Drilling

N

0 0.5 1

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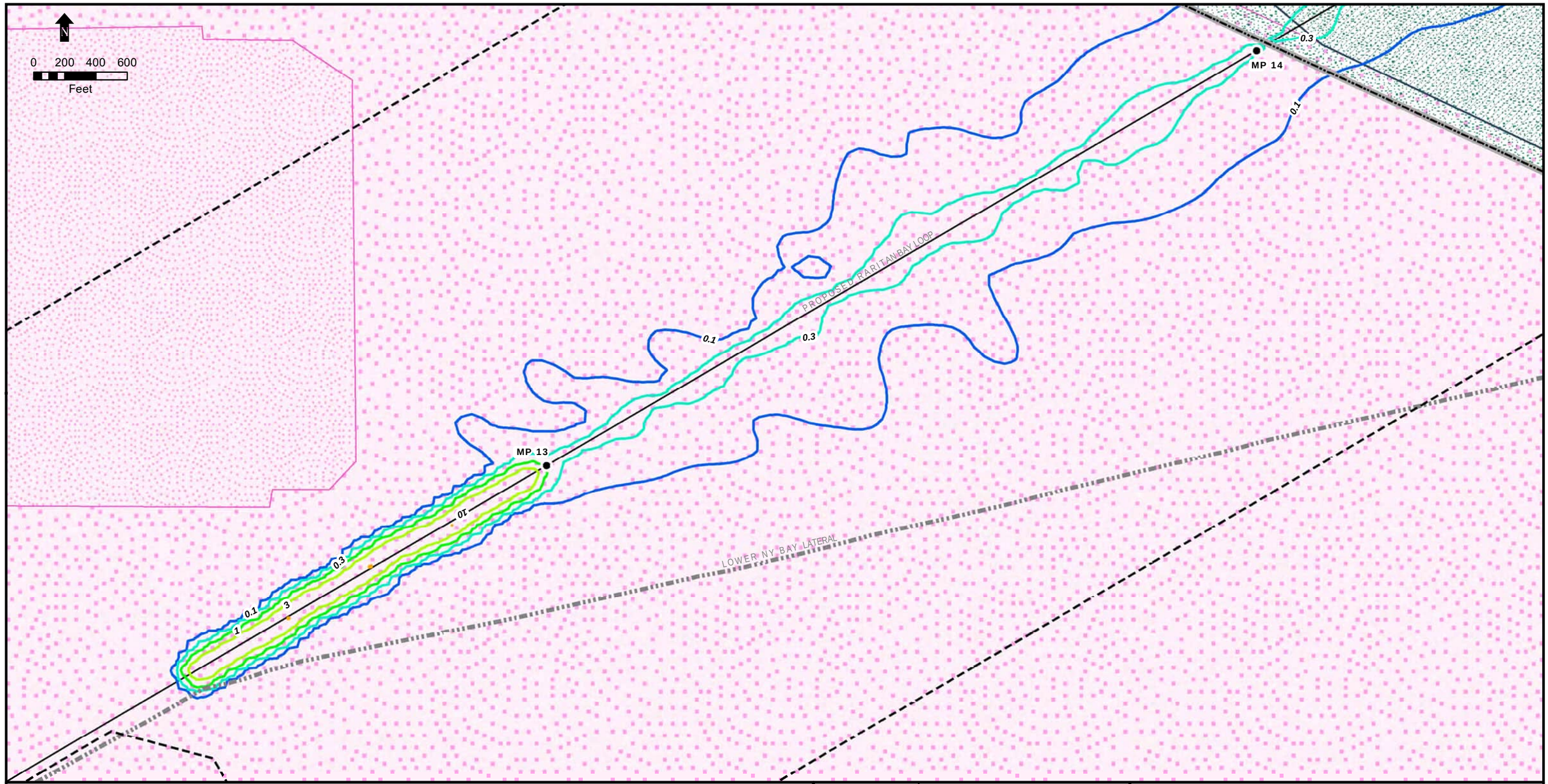
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	MK	ISSUED FOR PERMITTING	1000891	AL	SM

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
INDEX MAP FOR OFFSHORE EXCAVATION
SEDIMENT MODELING SCENARIOS - ADDENDUM 2
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

DRAWN BY: MK	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: AL	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER:	SHEET 1 OF 1
WO: 1000891		3:14 PM 6/1/2018	FIGURE 50

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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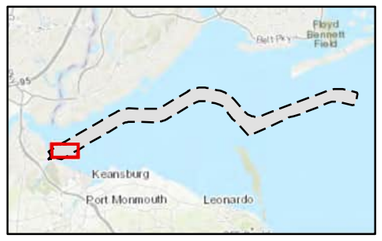
Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace

- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B1:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 51	SHEET 1 OF 3
WO: 1000891		3:37 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600
Feet

MP 15

MP 14

0.1

0.3

0.1

0.3

0.1

20

20

RARITAN BAY LATERAL

LOWER NY BAY LATERAL

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour

NYSDEC Special Permit Harvest Areas – Transplantation
NY Shellfish Land - Uncertified
NJ Shellfish Growing Water
Prohibited Harvest Area
Special Restricted Harvest Area
NJ DEP Hard Clam Relative Abundance (2014)
High

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B1:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE
TIE-IN (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL DATE: 6/1/2018
CHECKED BY: MK DATE: 6/1/2018
APPROVED BY: SM DATE: 6/1/2018
WO: 1000891

ISSUE FOR BID: N/A
ISSUE FOR CONSTRUCTION: N/A
Project features ver20

DRAWING NUMBER: FIGURE 52
SHEET 2 OF 3
3:38 PM 6/1/2018

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 16

PROPOSED RARITAN BAY LOOP

0.1

0.3

3

1

10

0.1

0.3

3

0.1

Legend

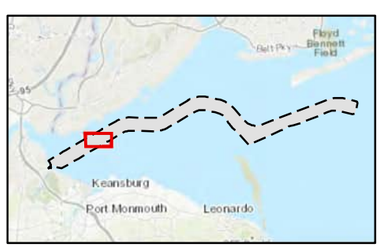
- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour

NYSDEC Special Permit Harvest Areas – Transplantation

NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B1:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

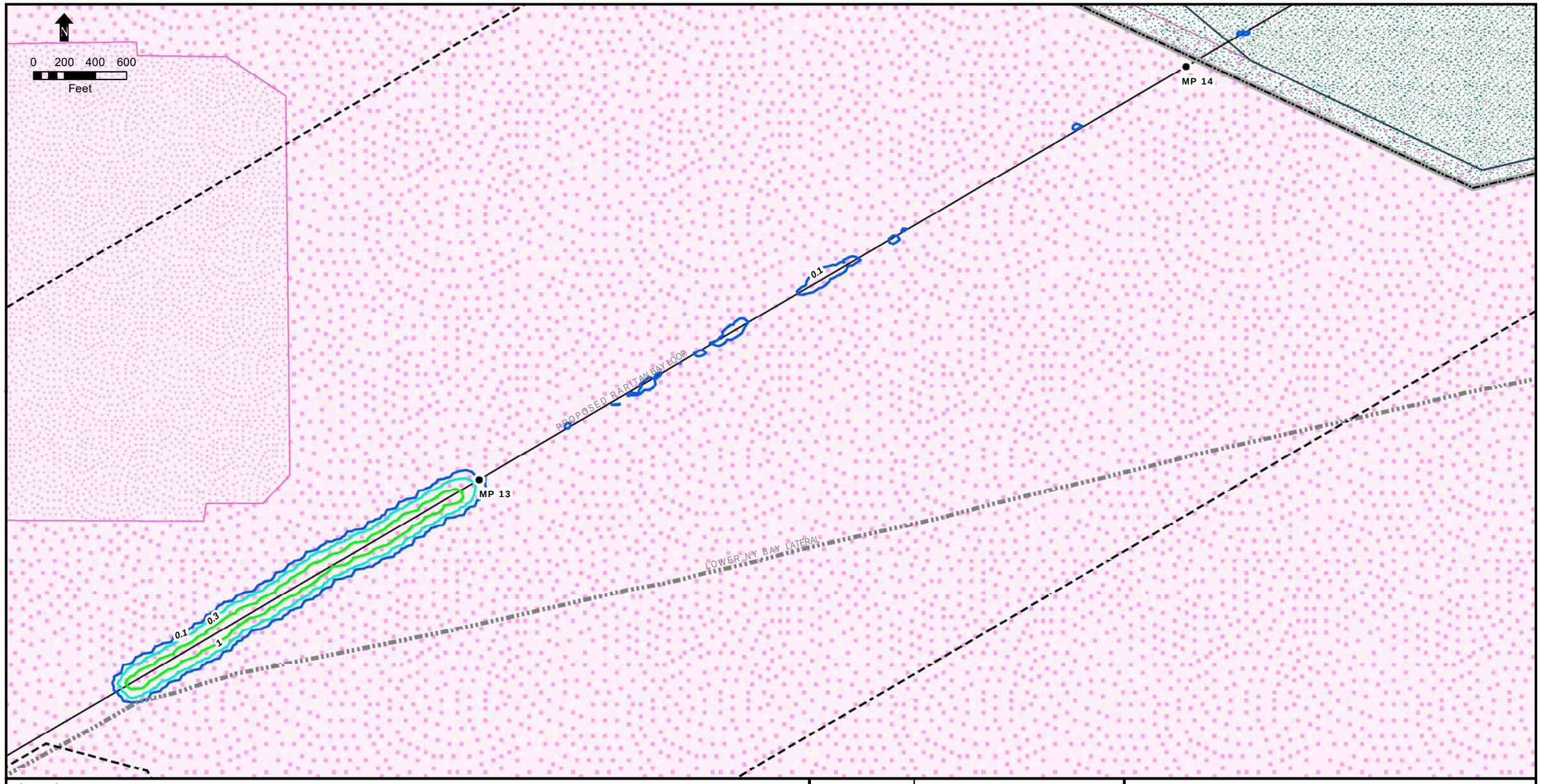
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 53	SHEET 3 OF 3
WO: 1000891		3:39 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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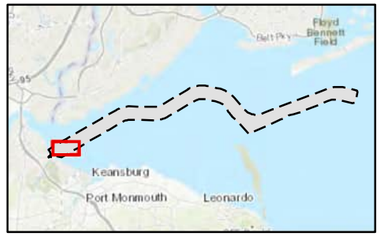


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B2:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 54	SHEET 1 OF 3
WO: 1000891		3:49 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 15

MP 14

0.1

PROPOSED RARITAN BAY LOOP

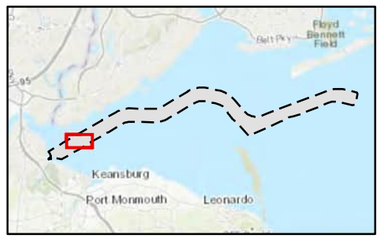
LOWER NY BAY LATERAL

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B2:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

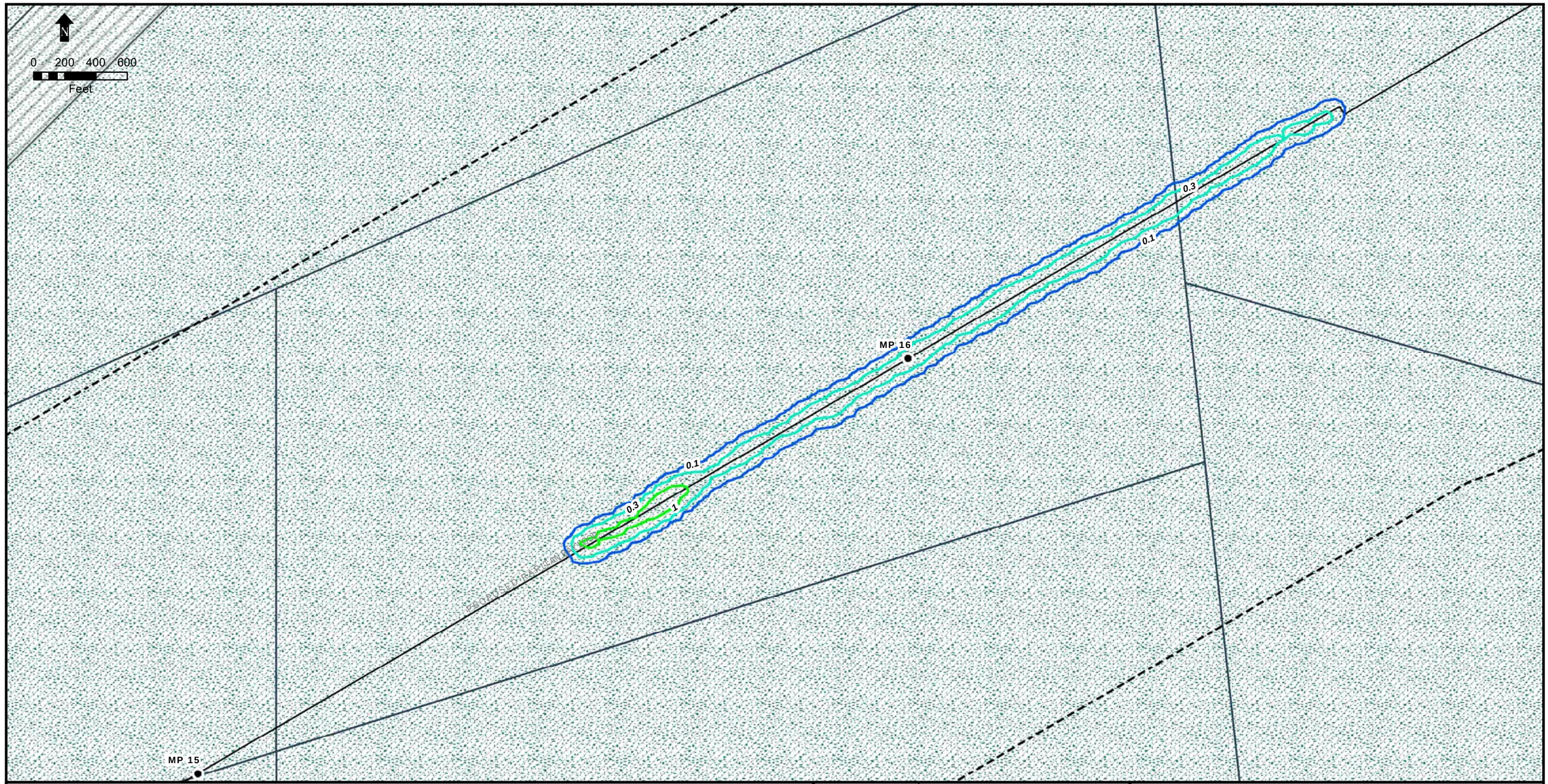
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 55	SHEET 2 OF 3
WO: 1000891		3:50 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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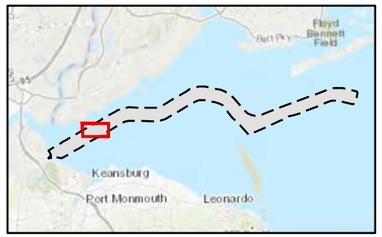


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B2:
CLAMSHELL TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 56	SHEET 3 OF 3
WO: 1000891		3:52 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600
Feet

MP 14

MP 13

PROPOSED RARITAN BAY LOOP

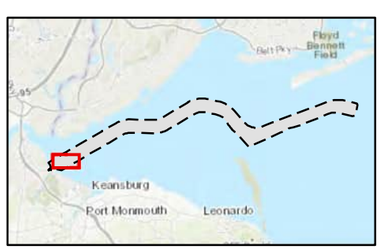
LOWER NY BAY LATERAL

0.1
0.3
1
3

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
  - High
  - Moderate

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B3:
JET TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN
(5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 57	SHEET 1 OF 3
WO: 1000891		3:51 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

20

20

MP 15

MP 14

0.1

0.3

1

PROPOSED RARITAN BAY LOOP

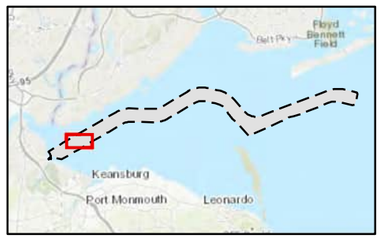
LOWER NY BAY LATERAL

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B3:
JET TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN
(5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

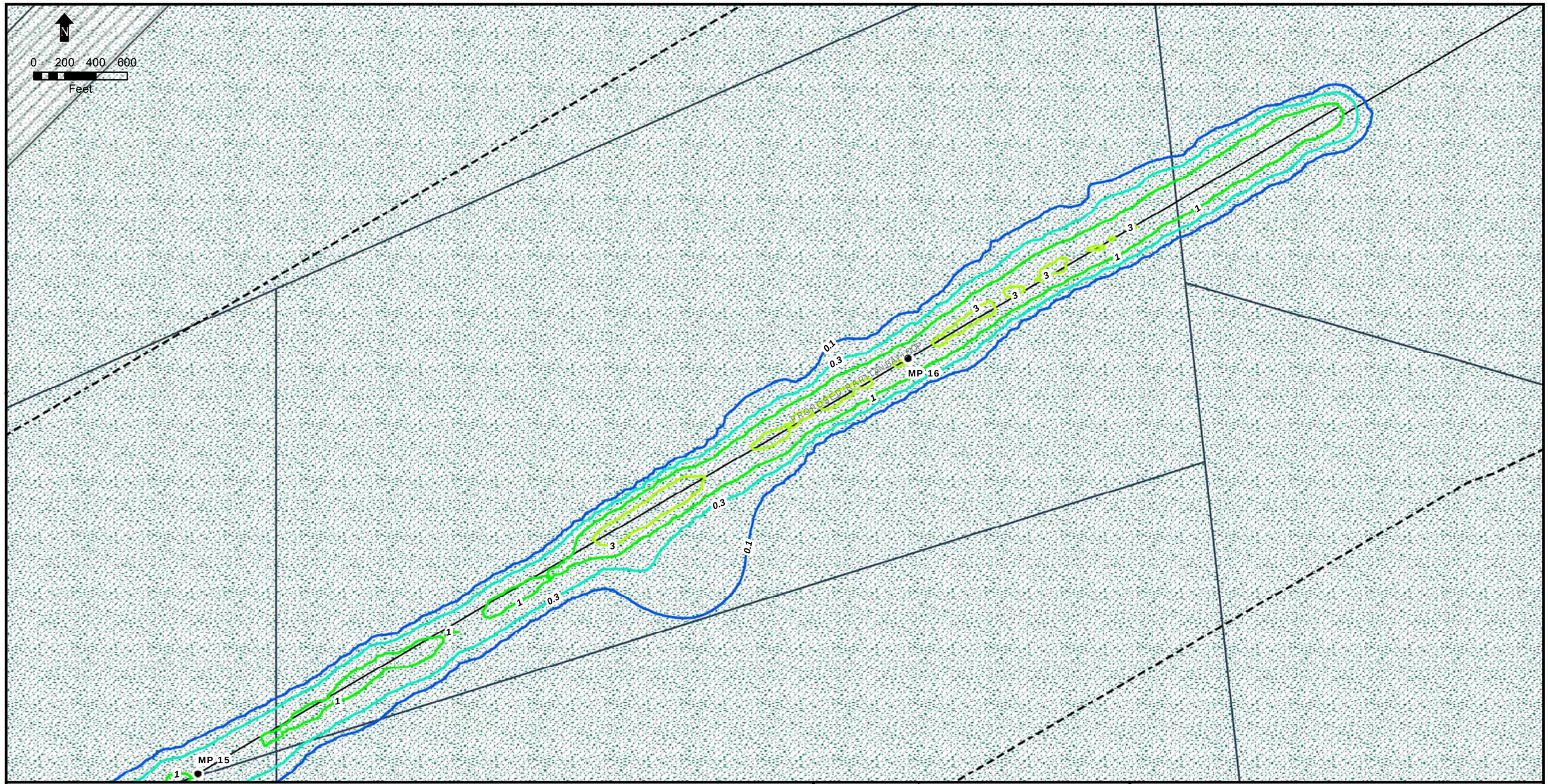
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 58	SHEET 2 OF 3
WO: 1000891		3:53 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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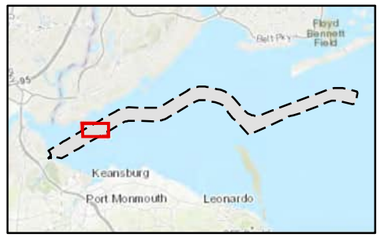


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B3:
JET TRENCHING MORGAN HDD PIT TO THE MIDLINE TIE-IN
(5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

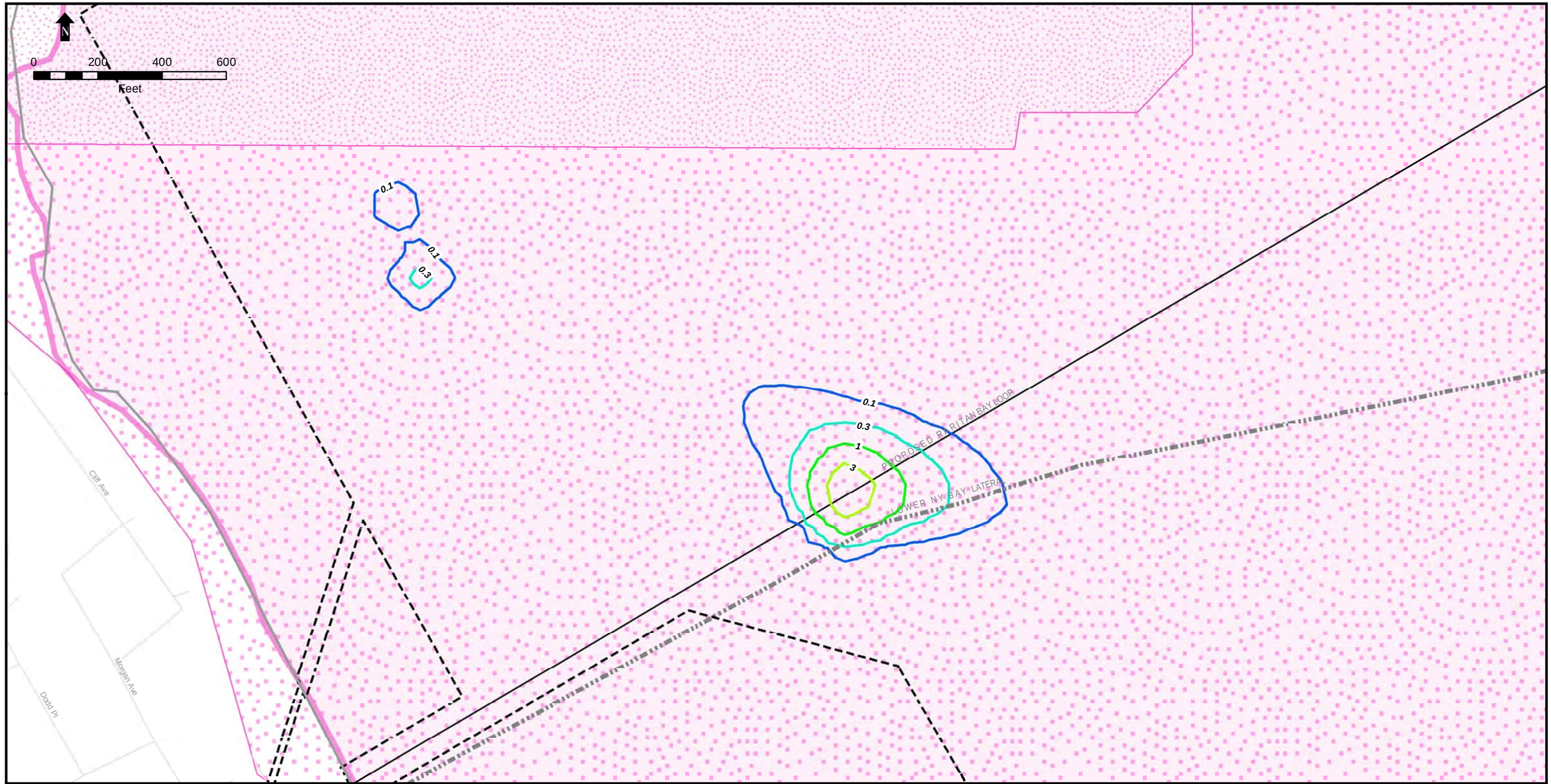
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 59	SHEET 3 OF 3
WO: 1000891		3:54 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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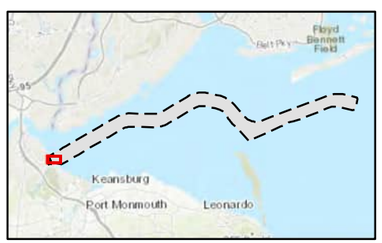
Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B4:
MORGAN SHORE EXCAVATION ACTIVITIES (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

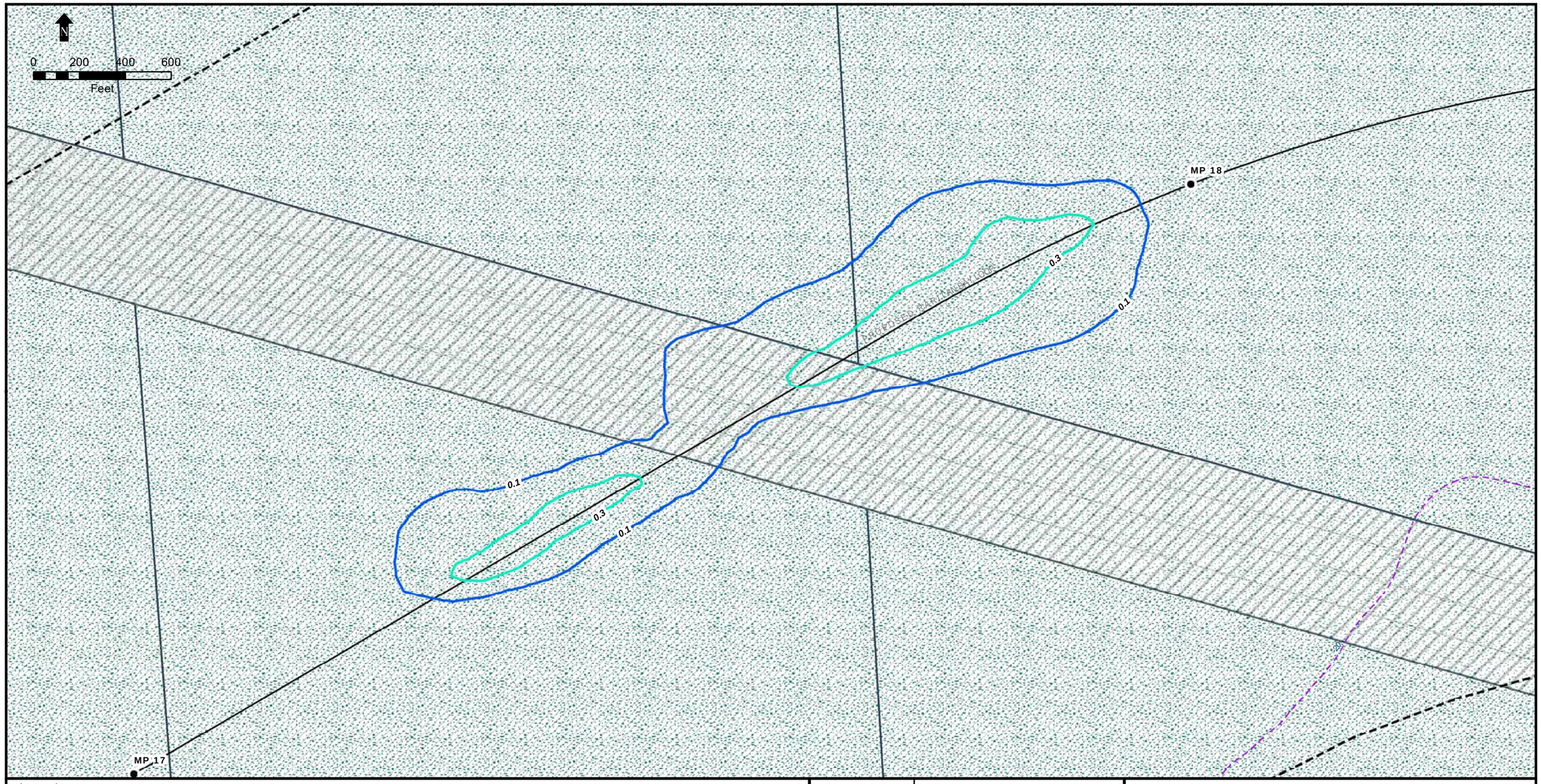
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 60	SHEET 1 OF 1
WO: 1000891		3:52 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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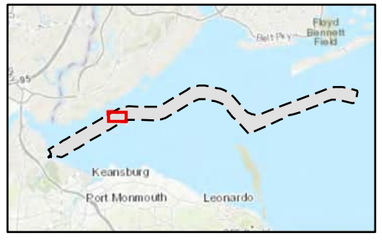


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B5:
CLAMSHELL TRENCHING ACROSS THE RARITAN CHANNEL
(0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 61	SHEET 1 OF 1
WO: 1000891		4:13 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 24

0.1

0.3

1

3

20

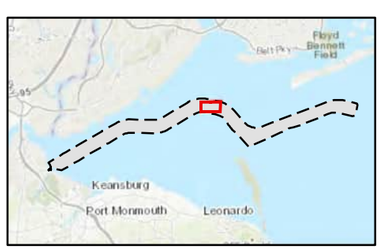
PROPOSED RARITAN BAY LOOP

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B6:
CLAMSHELL TRENCHING ANCHORAGE AREA AND THE CHAPEL HILL CHANNEL (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

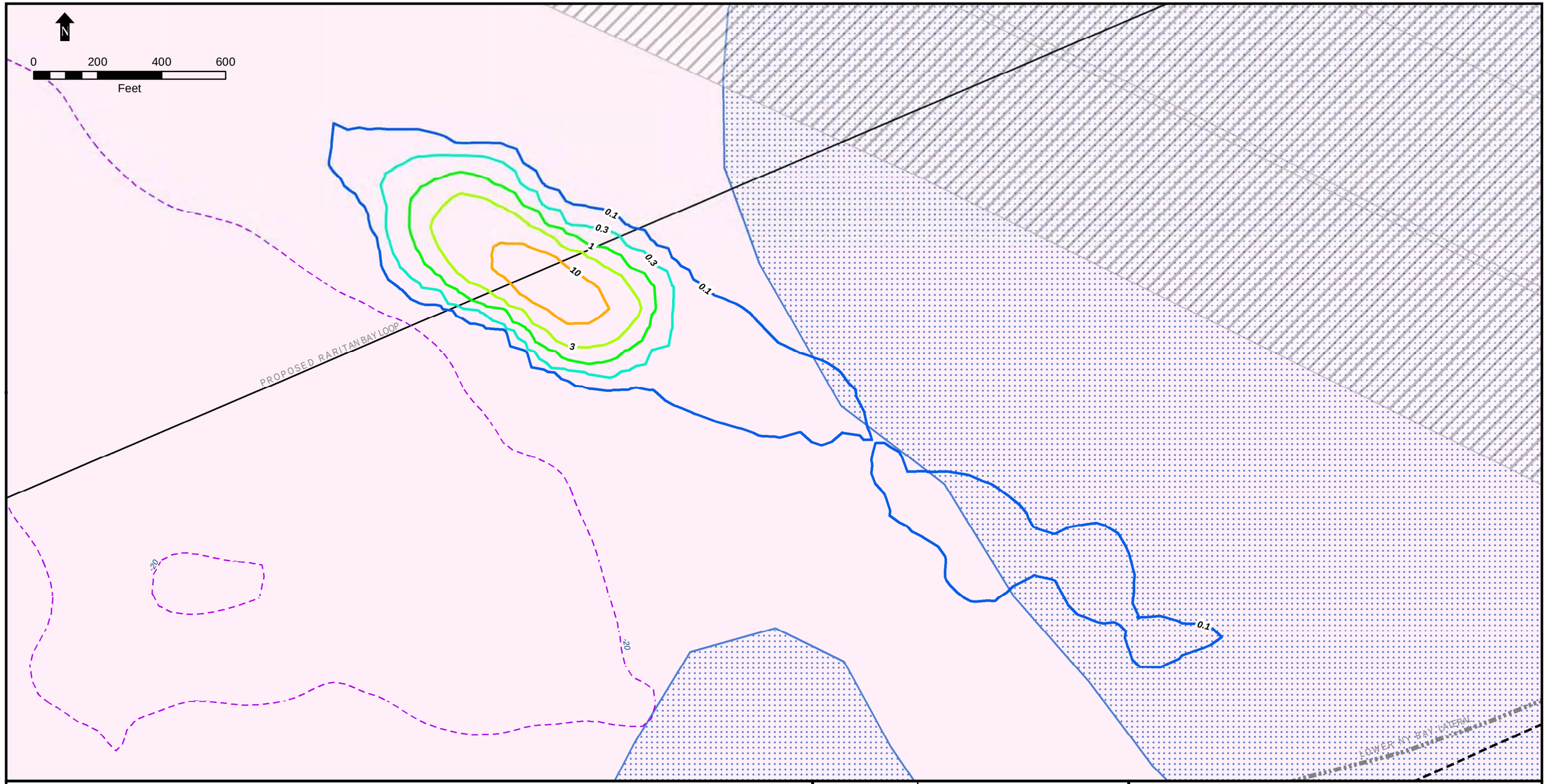
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 62	SHEET 1 OF 1
WO: 1000891		4:14 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B7:
EXCAVATION OF AMBROSE CHANNEL HDD PIT (WEST) (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 63	SHEET 1 OF 1
WO: 1000891		4:15 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

PROPOSED RARITAN BAY LOOP

0.1

3

1

0.3

0.1

-20

-20

-20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NJ Shellfish Growing Water Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B8:
EXCAVATION OF AMBROSE CHANNEL HDD PIT (WEST)
(0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 64	SHEET 1 OF 1
WO: 1000891		4:14 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

0.1
0.3
1
3
10
30
100

PROPOSED RARITAN BAY LOOP

20

20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B9:
EXCAVATION OF AMBROSE HDD PIT (EAST) AND
AMBROSE CHANNEL TIE-IN (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 65	SHEET 1 OF 1
WO: 1000891		4:15 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 35

MP 35.5

0.1

0.3

1

3

10

30

100

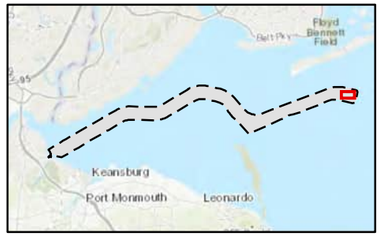
300

1000

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- NY Shellfish Land - Certified

Estimated Deposition (mm)



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B10:
CLAMSHELL TRENCHING FROM NEPTUNE CROSSING TO END OF PIPELINE (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL DATE: 6/1/2018
CHECKED BY: MK DATE: 6/1/2018
APPROVED BY: SM DATE: 6/1/2018
WO: 1000891

ISSUE FOR BID: N/A
ISSUE FOR CONSTRUCTION: N/A

Project features ver20

DRAWING NUMBER: FIGURE 66

SHEET 1 OF 1

4:20 PM 6/1/2018

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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PROPOSED RARITAN BAY LOOP

LOWER NY BAY LATERAL

20

30

1

3

0.1

0.3

10

30

100

300

1000

N

0 1,000 2,000 3,000

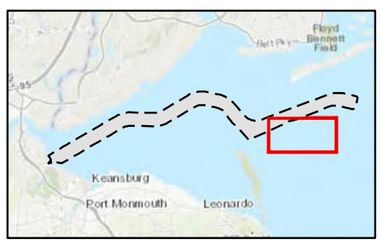
Feet

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B11:
DREDGING OF BACKFILL SOURCE MATERIAL FROM
AMBROSE CHANNEL (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

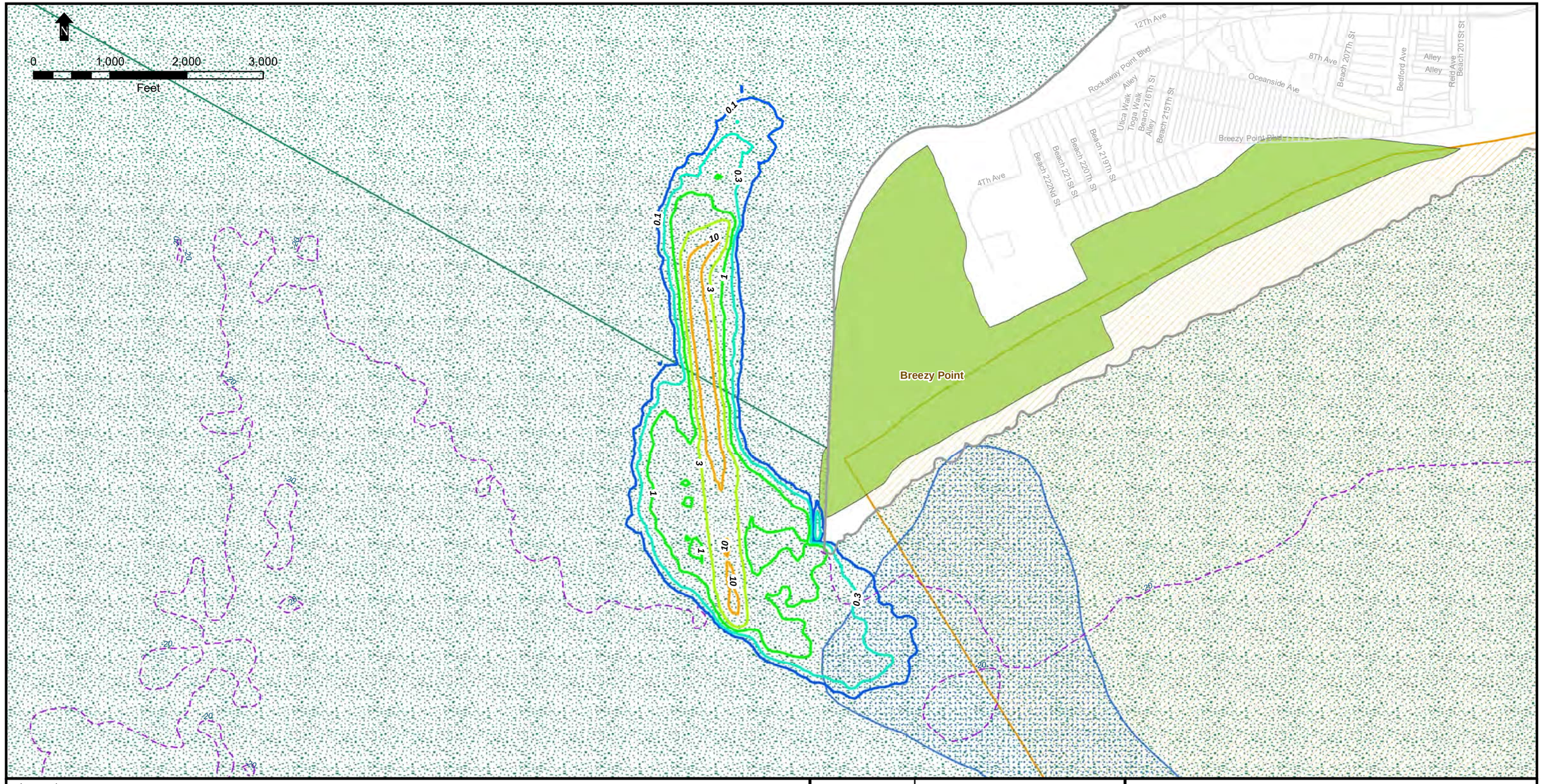
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 67	SHEET 1 OF 1
WO: 1000891		4:18 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NYSDOS Significant Habitats
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B12:
DREDGING OF BACKFILL SOURCE MATERIAL FROM
ROCKAWAY INLET (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

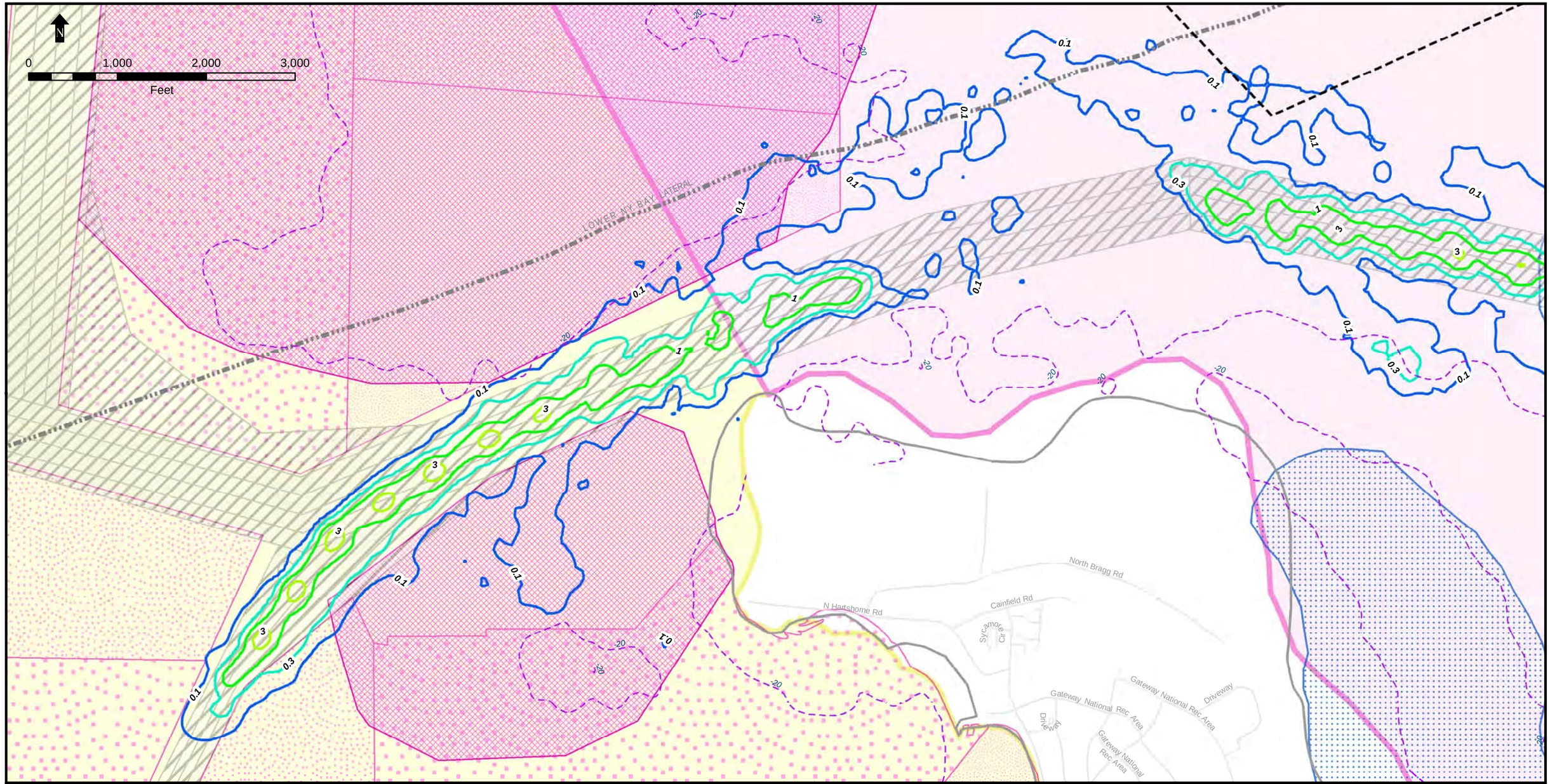
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 68	SHEET 1 OF 1
WO: 1000891		4:20 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water
- Prohibited Harvest Area
- Special Restricted Harvest Area

NJ DEP Surf Clam Relative Abundance (2014)

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate
- Low

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B13:
DREDGING OF BACKFILL SOURCE MATERIAL FROM EARLE CHANNEL (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 69	SHEET 1 OF 3
WO: 1000891		4:20 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 1,000 2,000 3,000

Feet

LOWER NY BAY LATERAL

North Bragg Rd

Cainfield Rd

Sycamore Cir

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water

- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B13:
DREDGING OF BACKFILL SOURCE MATERIAL FROM EARLE CHANNEL (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 70	SHEET 2 OF 3
WO: 1000891		4:23 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 1,000 2,000 3,000

Feet

Legend

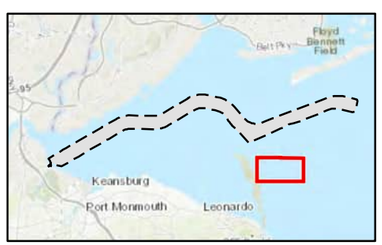
- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water

- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B13:
DREDGING OF BACKFILL SOURCE MATERIAL FROM
EARLE CHANNEL (2.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL DATE: 6/1/2018
CHECKED BY: MK DATE: 6/1/2018
APPROVED BY: SM DATE: 6/1/2018
WO: 1000891

ISSUE FOR BID: N/A
ISSUE FOR CONSTRUCTION: N/A
Project features ver20

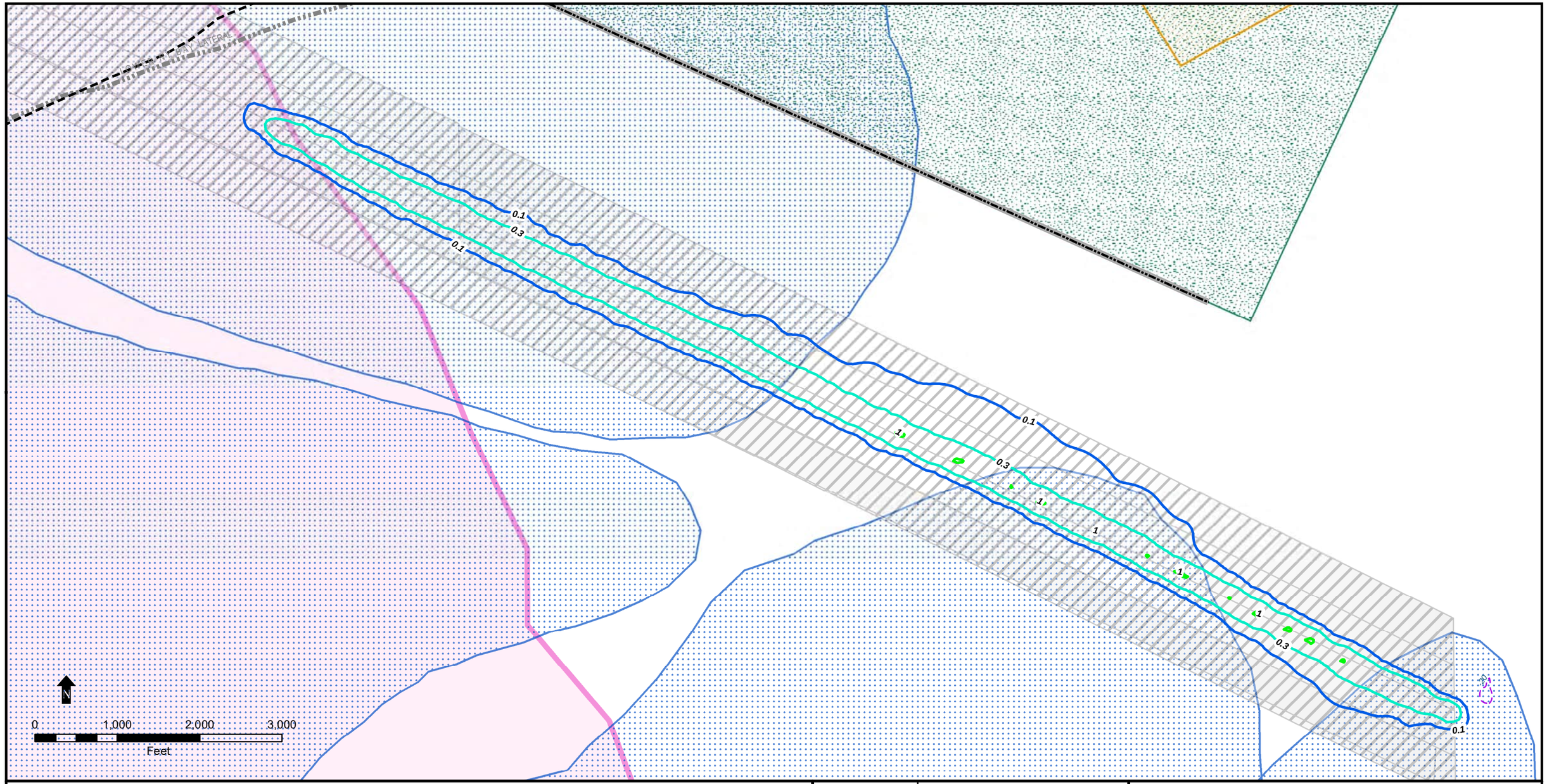
DRAWING NUMBER:
4:25 PM 6/1/2018

FIGURE 71

SHEET 3 OF 3

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B14:
DREDGING OF BACKFILL SOURCE MATERIAL FROM AMBROSE CHANNEL (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 72	SHEET 1 OF 1
WO: 1000891		4:20 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 1,000 2,000 3,000

Feet

Rockaway Point Blvd

4Th Ave

Alley

Beach 221St St

Beach 222Nd St

Beach 220Th St

Beach 219Th St

Beach 216Th St

Beach 215Th St

Breezy Point

0.3

1

0.1

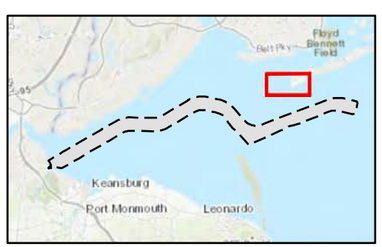
20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NYSDOS Significant Habitats
- NJDEP Sport Ocean Fishing Grounds
- NYSDEC Special Permit Harvest Areas – Surfclam Bait
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B15:
DREDGING OF BACKFILL SOURCE MATERIAL FROM
ROCKAWAY INLET (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

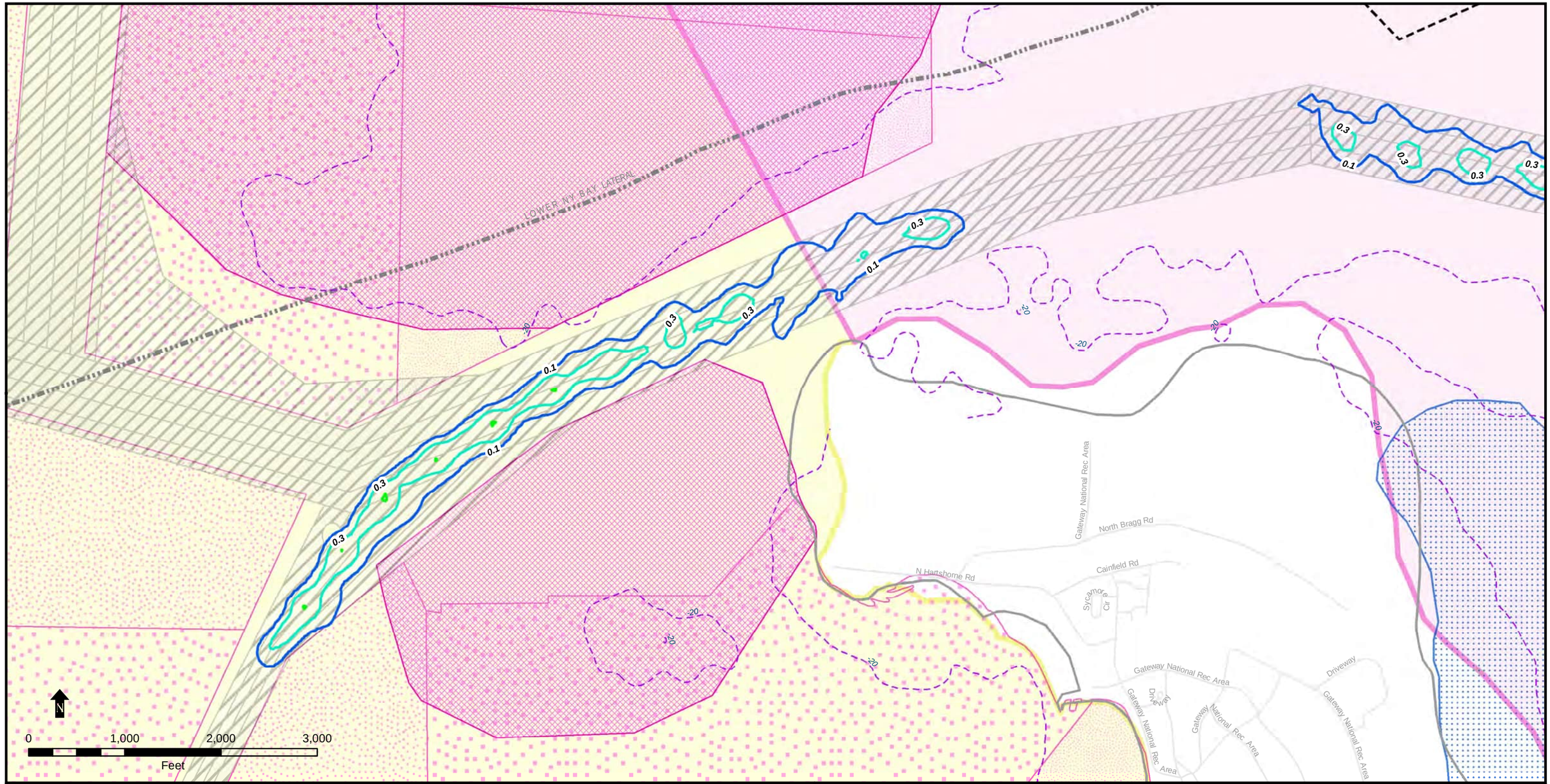
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 73	SHEET 1 OF 1
WO: 1000891		4:22 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water

- Prohibited Harvest Area
- Special Restricted Harvest Area
- NJ DEP Surf Clam Relative Abundance (2014)

NJ DEP Hard Clam Relative Abundance (2014)

- High
- Moderate
- Low

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B16:
DREDGING OF BACKFILL SOURCE MATERIAL FROM EARLE CHANNEL (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

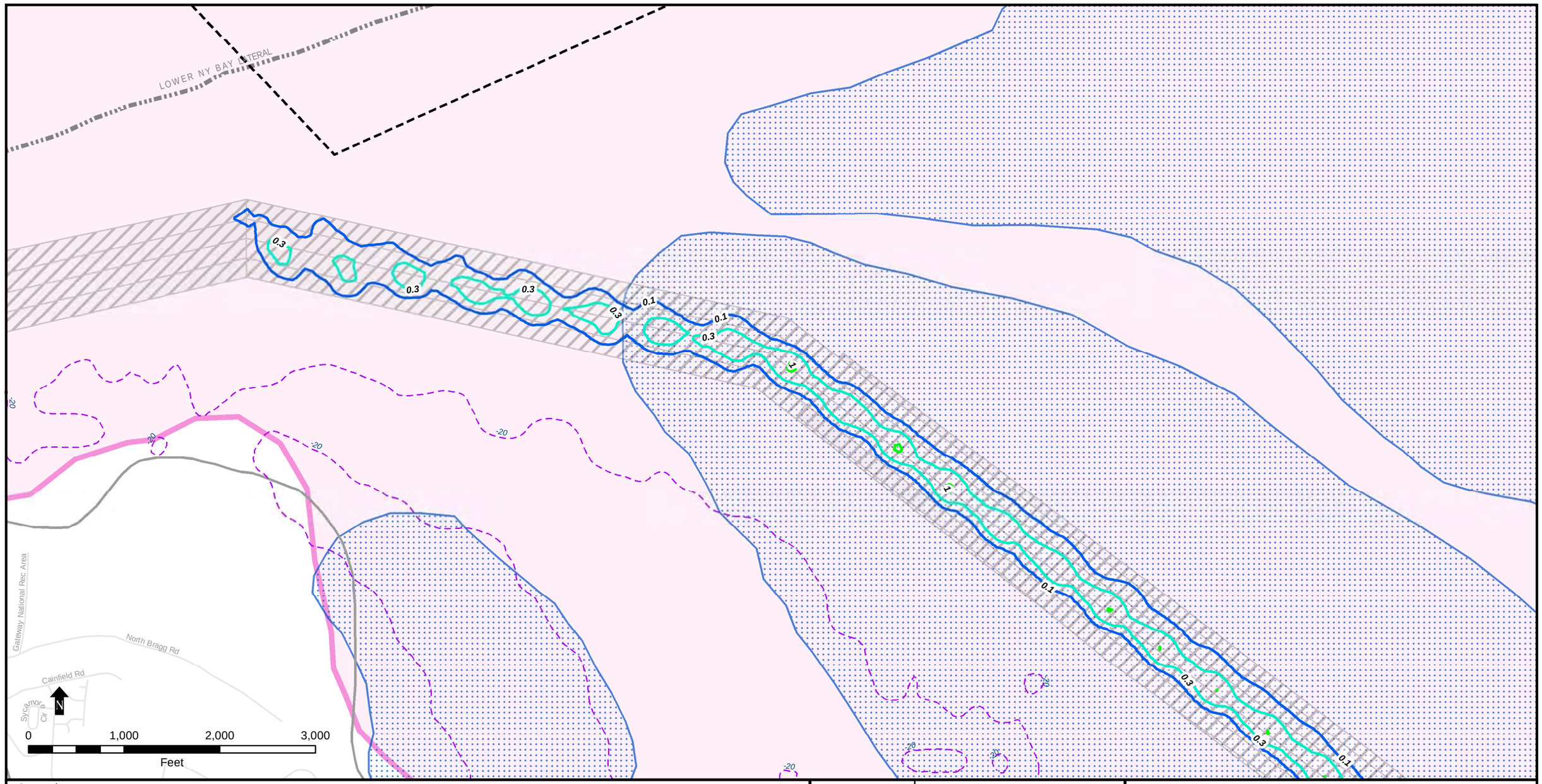
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 74	SHEET 1 OF 3
WO: 1000891		4:23 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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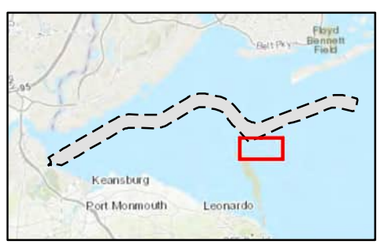


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B16:
DREDGING OF BACKFILL SOURCE MATERIAL FROM EARLE CHANNEL (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

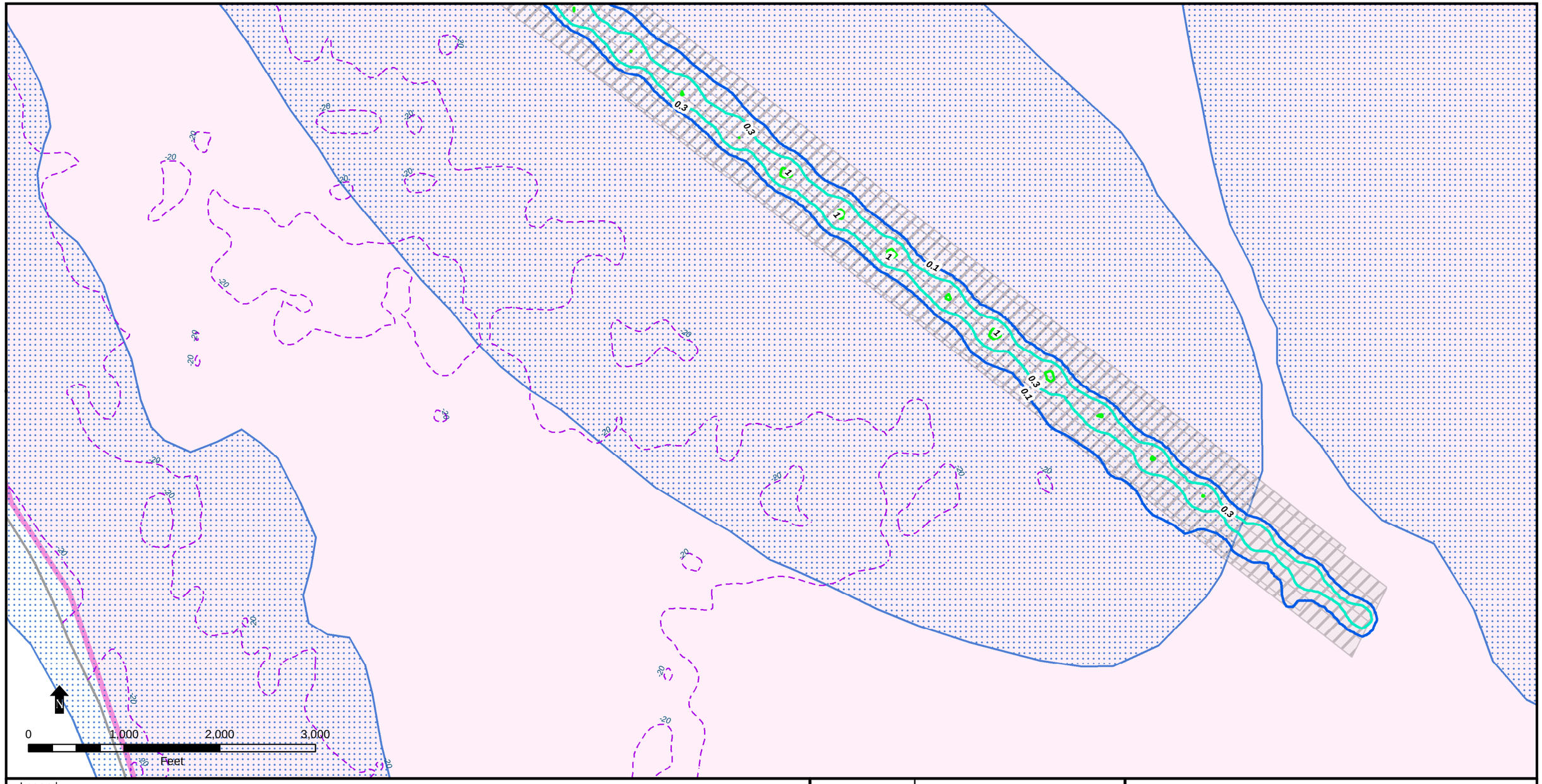
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 75	SHEET 2 OF 3
WO: 1000891		4:25 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

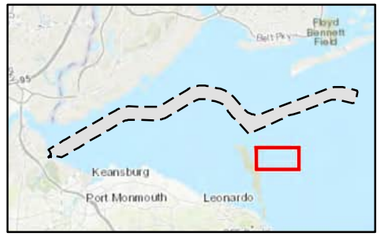
- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds

NJ Shellfish Growing Water

- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B16:
DREDGING OF BACKFILL SOURCE MATERIAL FROM EARLE CHANNEL (0.5% LOSS)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 76	SHEET 3 OF 3
WO: 1000891		4:28 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 500 1,000 1,500 2,000

Feet

MP. 24

MP. 25

PROPOSED RARITAN BAY LOOP

0.1 0.3 1 3 10 30 100 300

20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B17:
SIDE-CAST ACROSS THE ANCHORAGE AREA
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

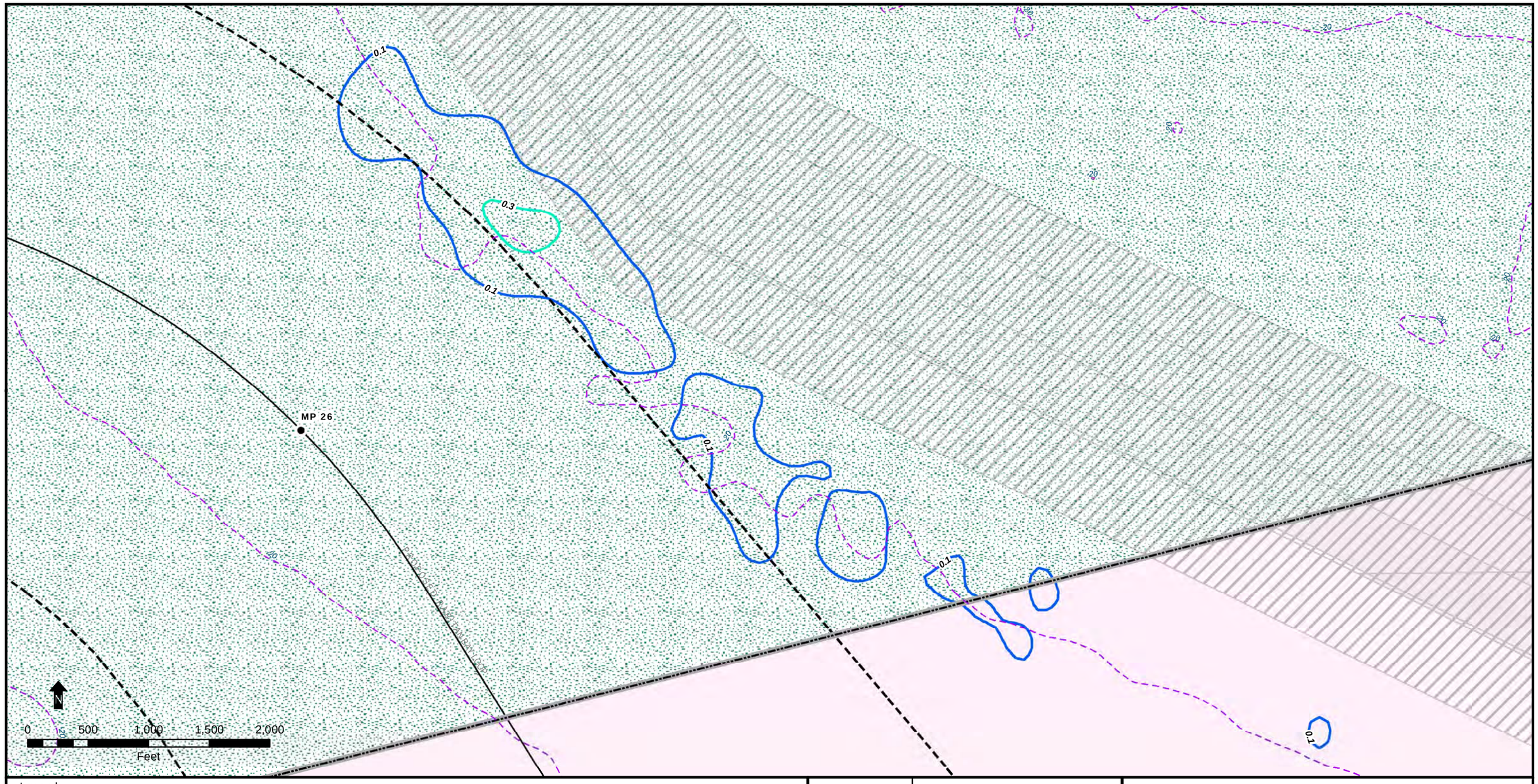
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 77	SHEET 1 OF 1
WO: 1000891		4:23 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

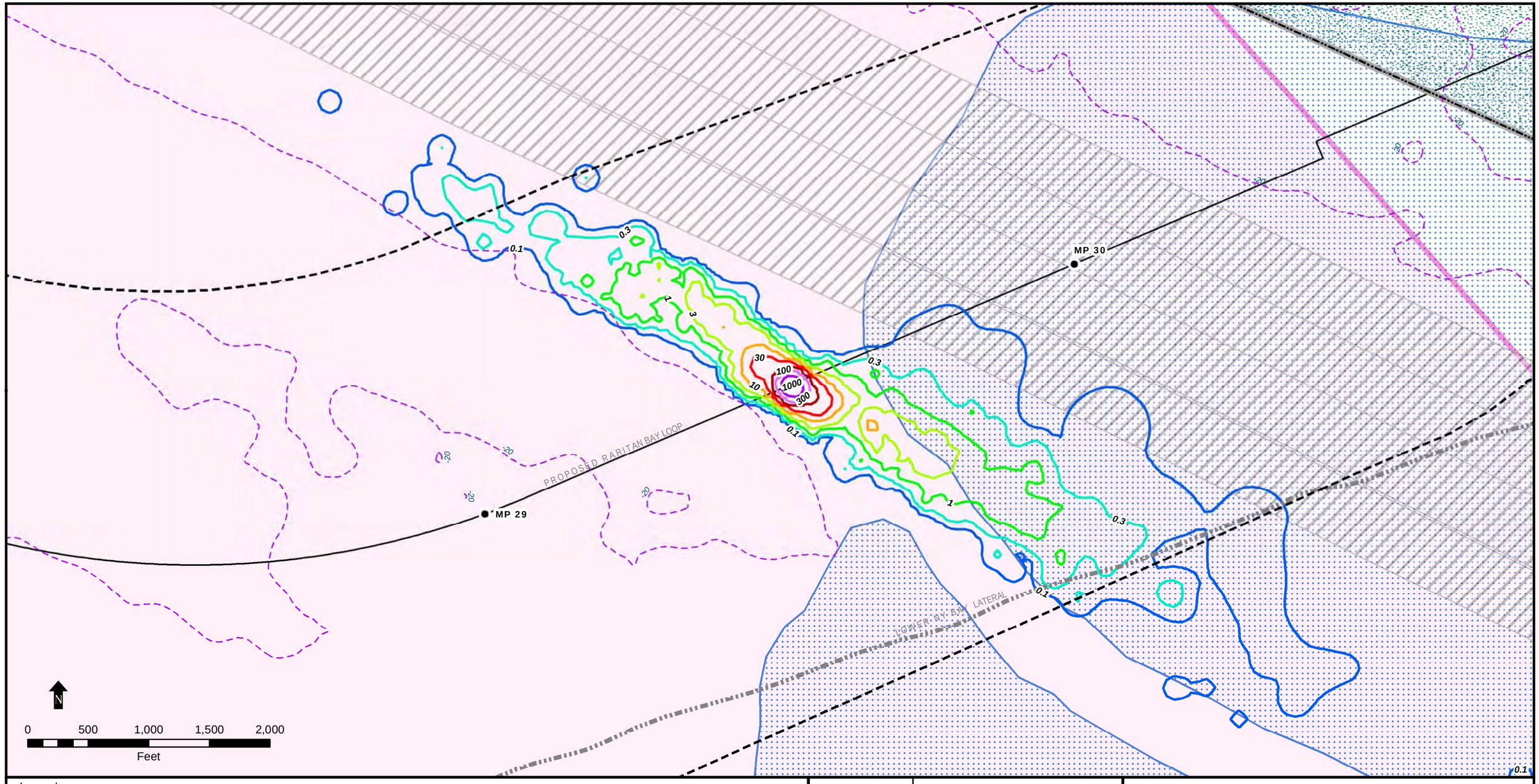
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B18:
SIDE-CAST AT THE AMBROSE HDD PIT (WEST)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 78	SHEET 1 OF 3
WO: 1000891		4:24 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B18:
SIDE-CAST AT THE AMBROSE HDD PIT (WEST)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

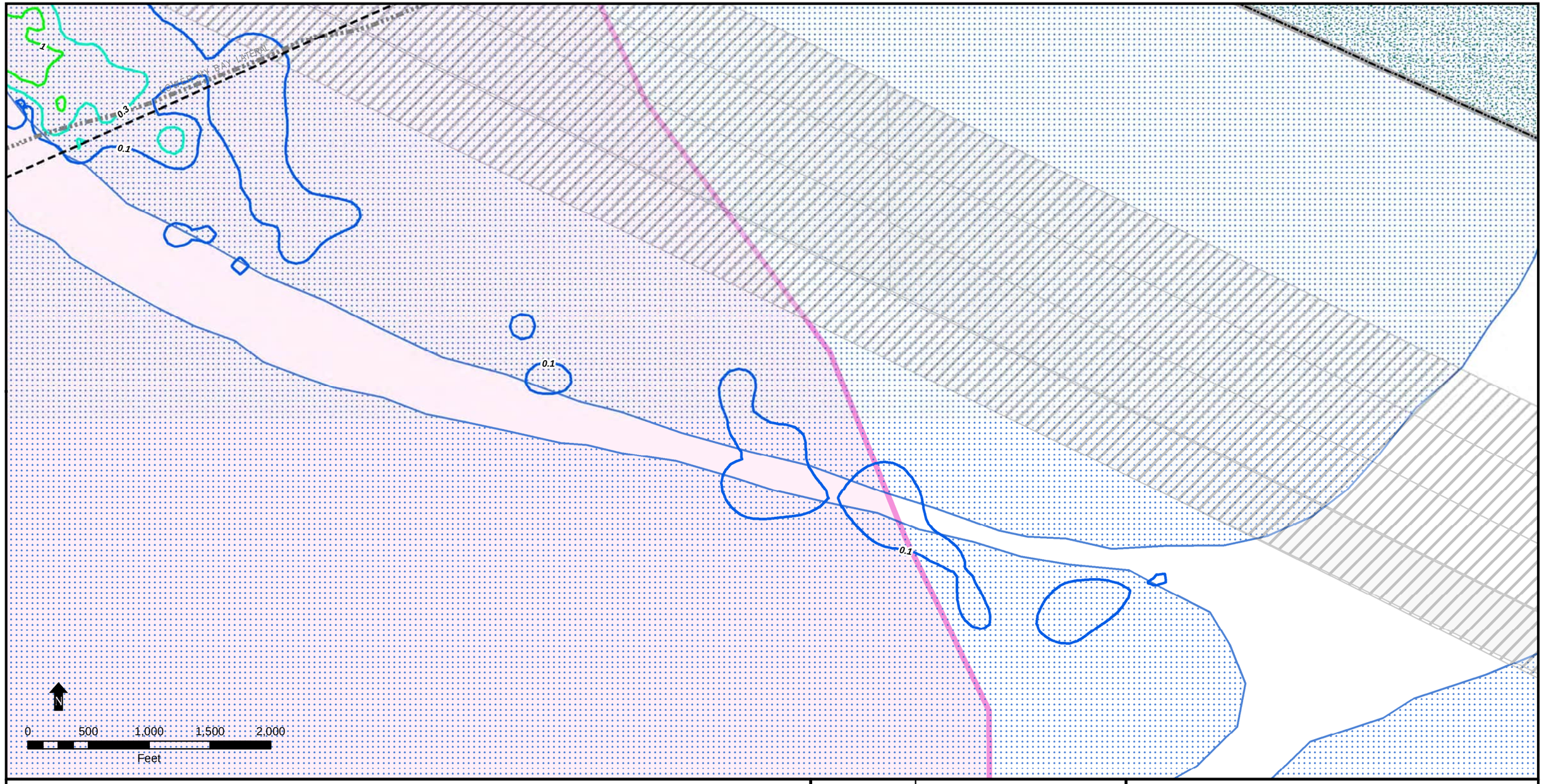
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 79	SHEET 2 OF 3
WO: 1000891		4:26 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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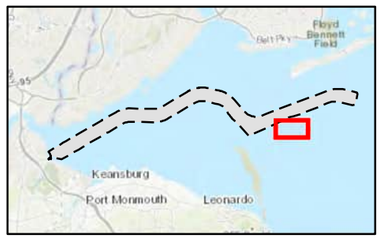


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B18:
SIDE-CAST AT THE AMBROSE HDD PIT (WEST)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 80	SHEET 3 OF 3
WO: 1000891		4:28 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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MP 31

MP 30

PROPOSED RARITAN BAY LOOP

0.1 0.3 1 3 10 30 100 300 1000 20

N

0 200 400 600 800 1,000

Feet

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B19:
SIDE-CAST AT THE AMBROSE HDD PIT (EAST) AND AMBROSE CHANNEL TIE-IN
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

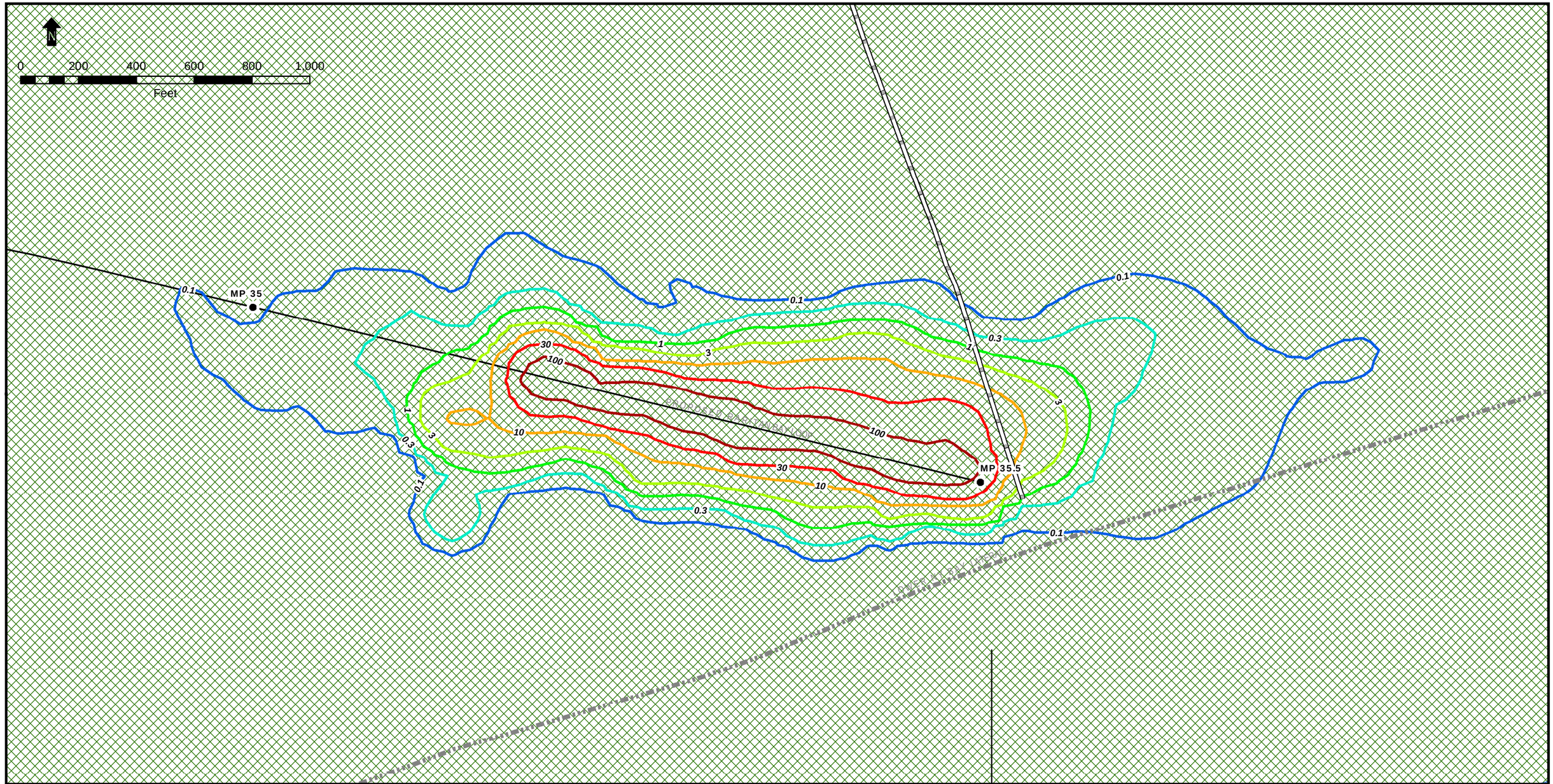
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 81	SHEET 1 OF 1
WO: 1000891		4:24 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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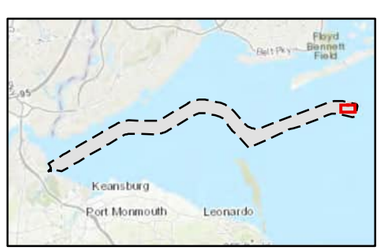


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Certified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B20:
SIDE-CAST BETWEEN THE NEPTUNE CROSSING AND END OF PIPE
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

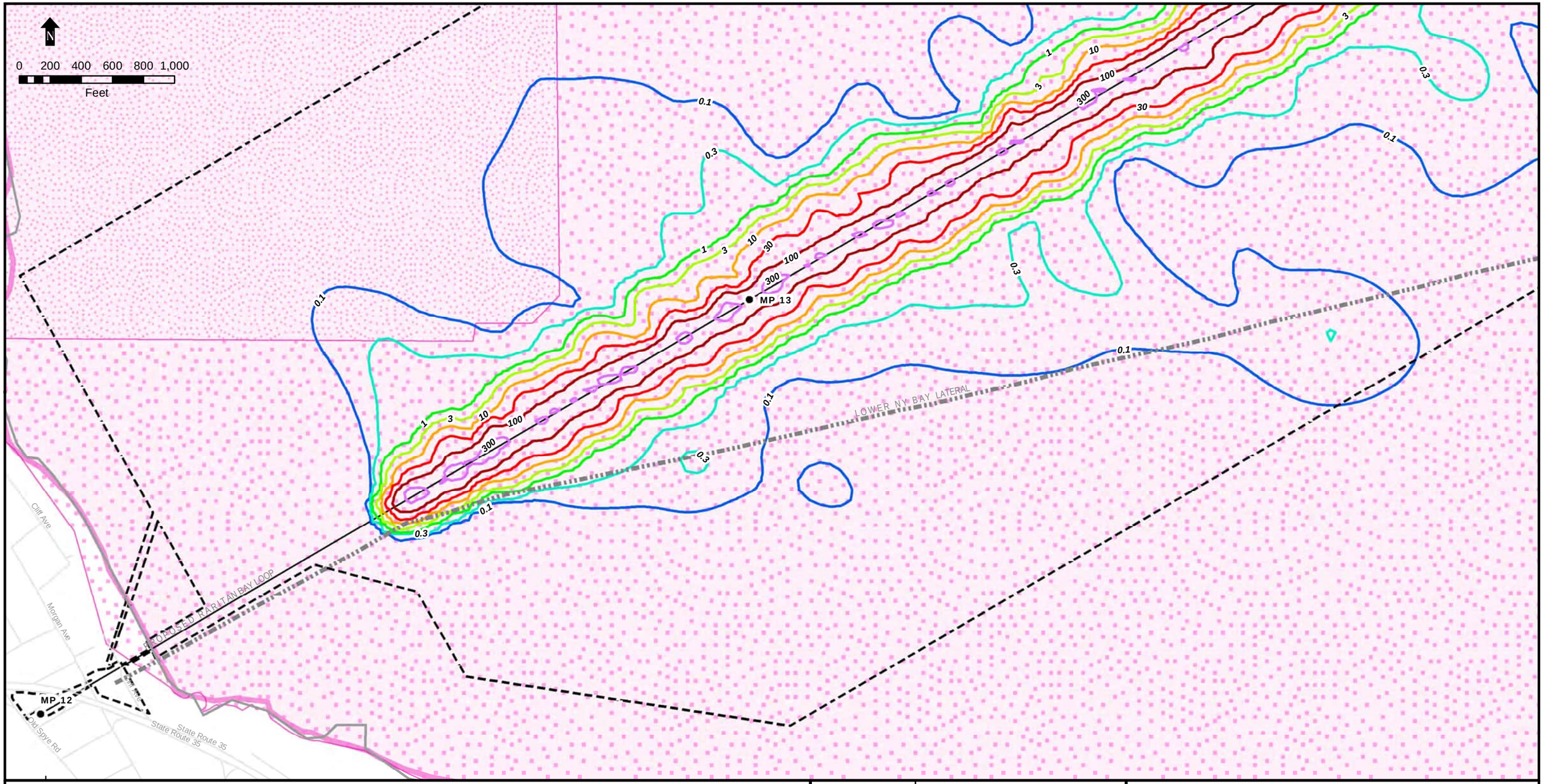
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 82	SHEET 1 OF 1
WO: 1000891		4:29 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
  - High
  - Moderate

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B21:
BACKFILL OF TRENCH - MORGAN HDD PIT TO MIDLINE
TIE-IN (7,500 CF/HR)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

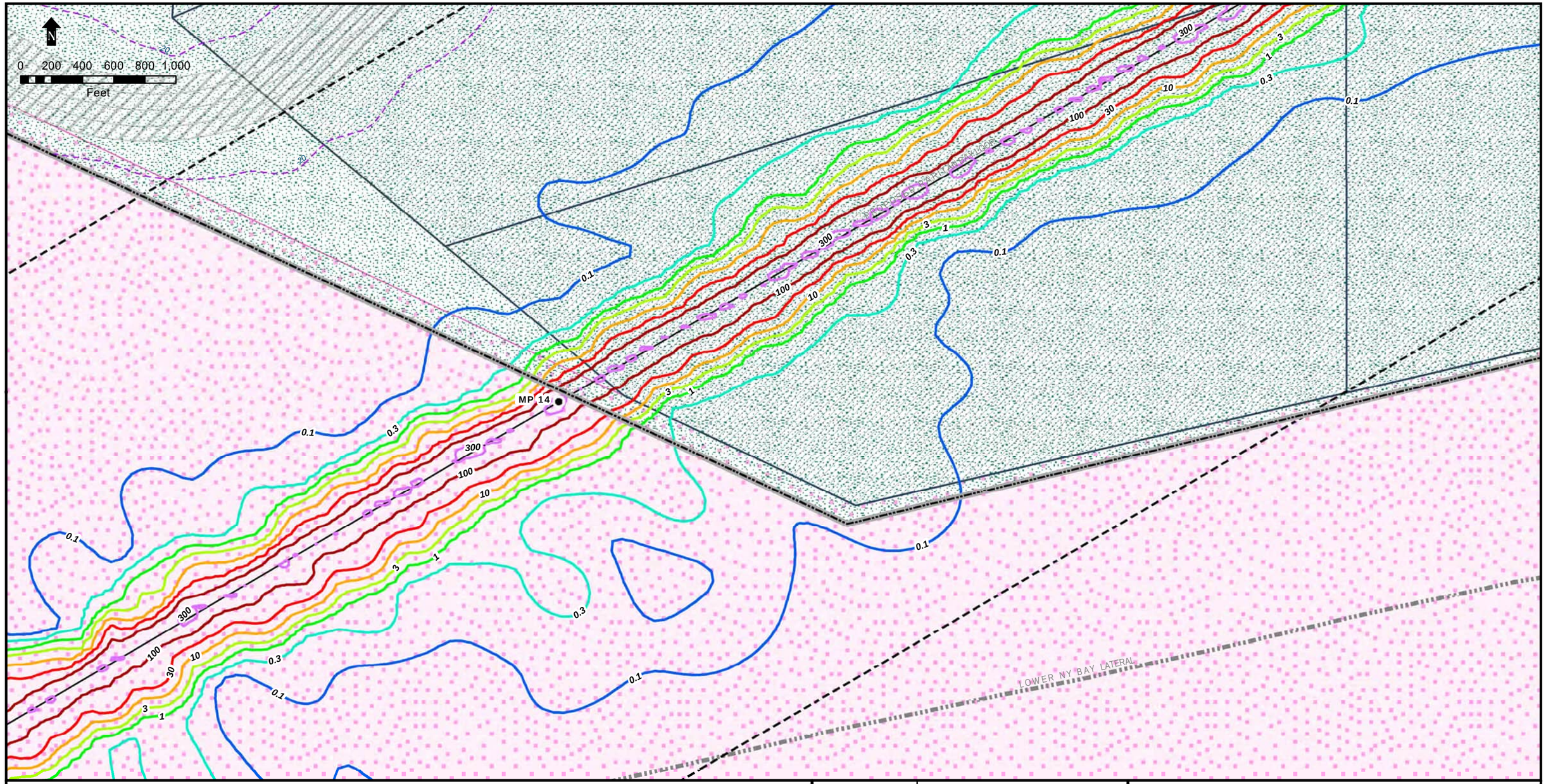
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 83	SHEET 1 OF 4
WO: 1000891		4:29 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B21:
BACKFILL OF TRENCH - MORGAN HDD PIT TO MIDLINE
TIE-IN (7,500 CF/HR)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

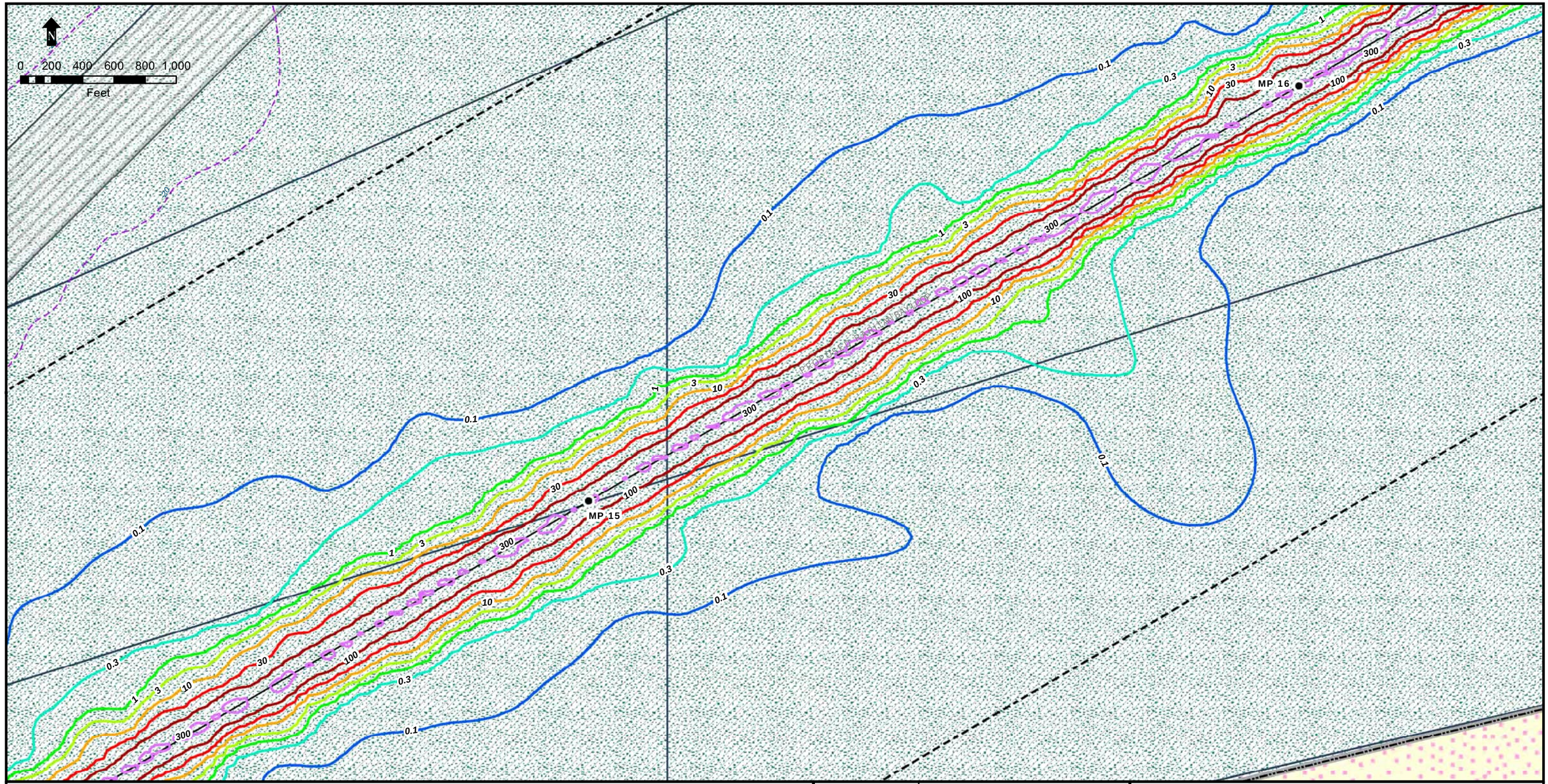
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 84	SHEET 2 OF 4
WO: 1000891		4:31 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Special Restricted Harvest Area
- NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B21:
BACKFILL OF TRENCH - MORGAN HDD PIT TO MIDLINE
TIE-IN (7,500 CF/HR)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

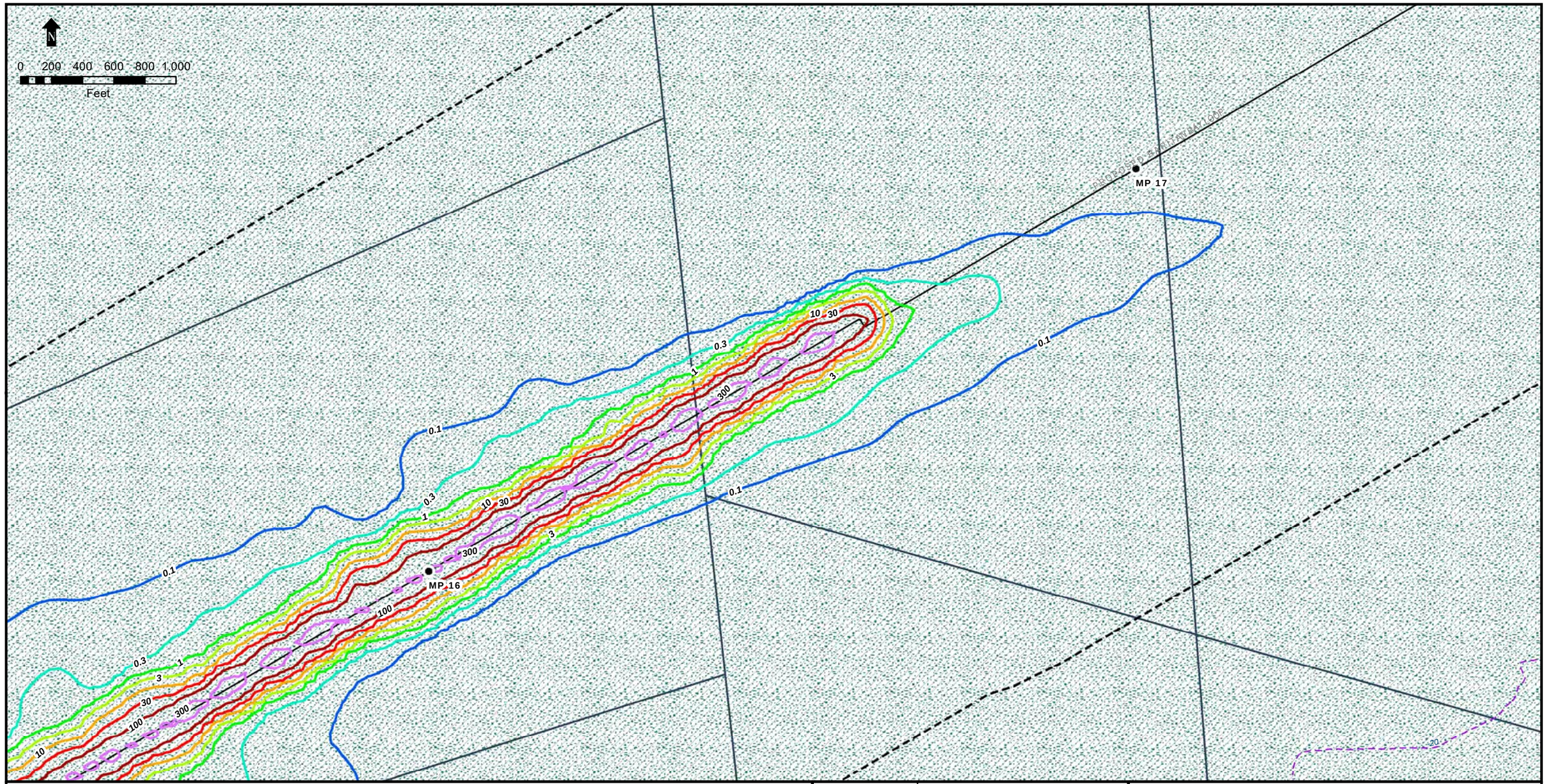
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 85	SHEET 3 OF 4
WO: 1000891		4:32 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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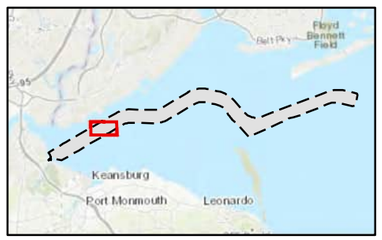


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B21:
BACKFILL OF TRENCH - MORGAN HDD PIT TO MIDLINE
TIE-IN (7,500 CF/HR)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 86	SHEET 4 OF 4
WO: 1000891		4:34 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600 800 1,000

Feet

MP 30

MP 29

PROPOSED RARITAN BAY LOOP

LOWER NY BAY LATERAL

0.1

0.3

1

3

10

30

100

300

1000

-20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO B22:
BACKFILL OF AMBROSE HDD PIT (WEST) (7,500 CF/HR)
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

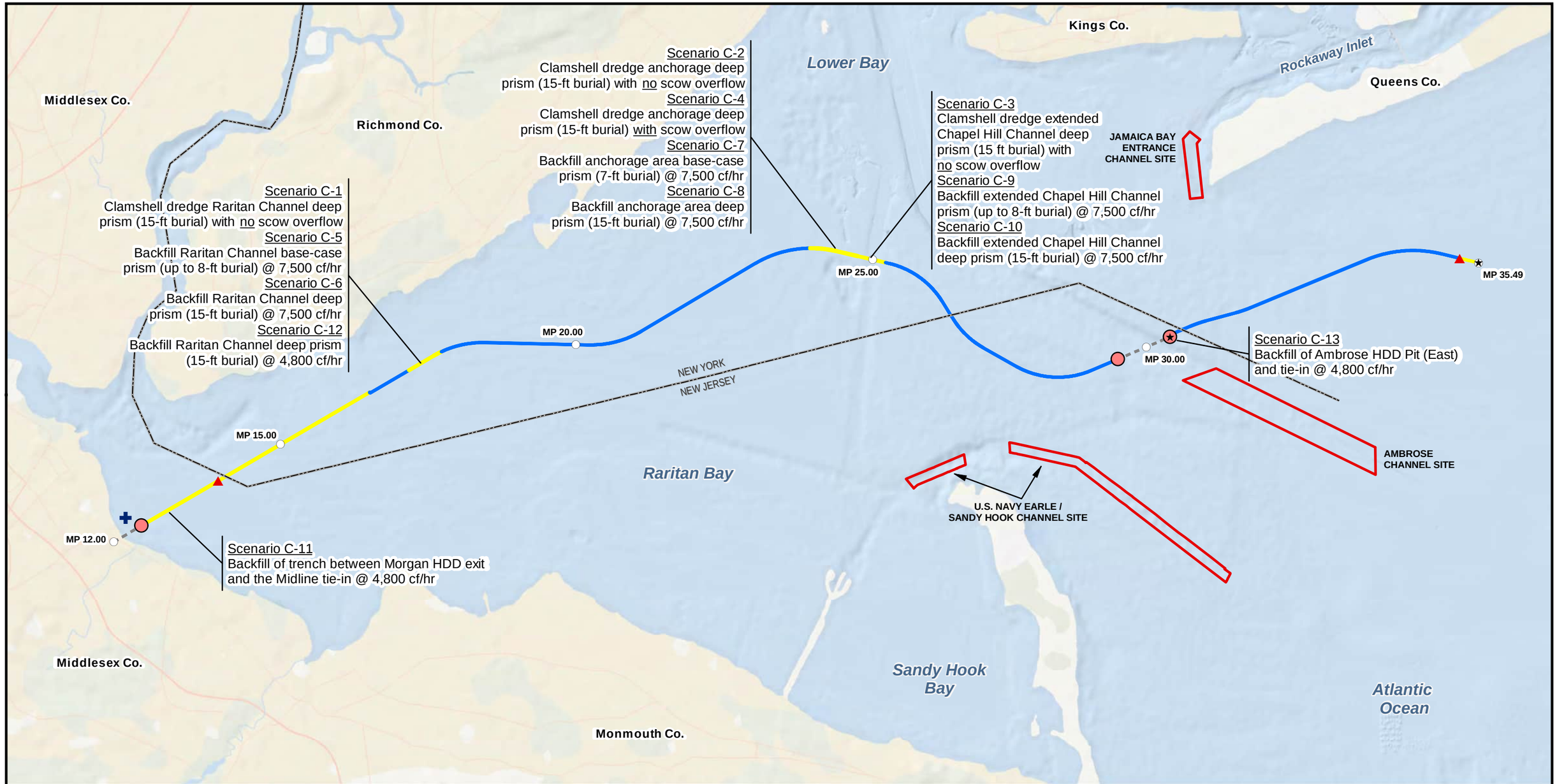
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	6/1/2018	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 6/1/2018	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 6/1/2018	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 6/1/2018	DRAWING NUMBER: FIGURE 87	SHEET 1 OF 1
WO: 1000891		4:30 PM 6/1/2018	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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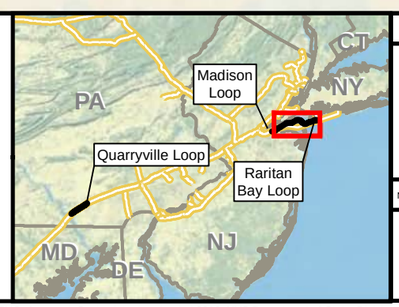
Legend

- HDD Pit
- Anode Sled Excavation
- Cable Crossing
- Tie-in Point
- Milepost
- NY/NJ Boundary
- Potential Offshore Backfill Source
- Proposed Raritan Bay Loop
- Post-Lay (Jet) Trenching
- Pre-Lay (Clamshell) Trenching
- Horizontal Directional Drilling

N

0 0.5 1

Miles



DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	MK	ISSUED FOR PERMITTING	1000891	AL	SM

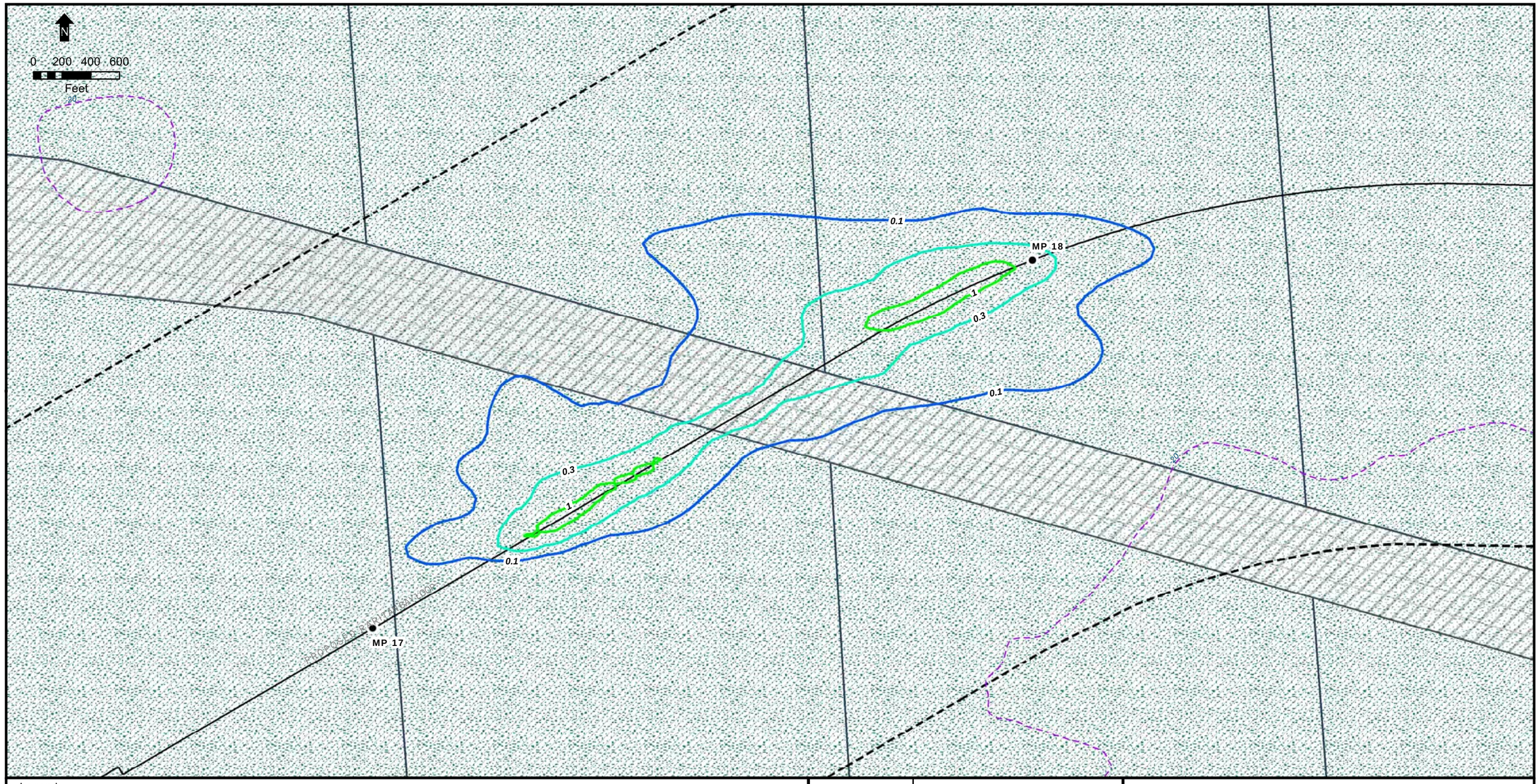
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
INDEX MAP FOR OFFSHORE SEDIMENT
MODELING SCENARIOS - ADDENDUM 3
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

DRAWN BY: MK	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: AL	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 89	SHEET 1 OF 1
WO: 1000891		5:29 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C1:
CLAMSHELL DREDGE RARITAN CHANNEL DEEP PRISM
(15-FT BURIAL) WITH NO SCOW OVERFLOW
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 90	SHEET 1 OF 1
WO: 1000891		5:30 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 24

MP 25

PROPOSED RARITAN BAY LOOP

0.1

0.3

1

3

20'

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C2:
CLAMSHELL DREDGE ANCHORAGE DEEP PRISM (15-FT BURIAL) WITH NO SCOW OVERFLOW
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

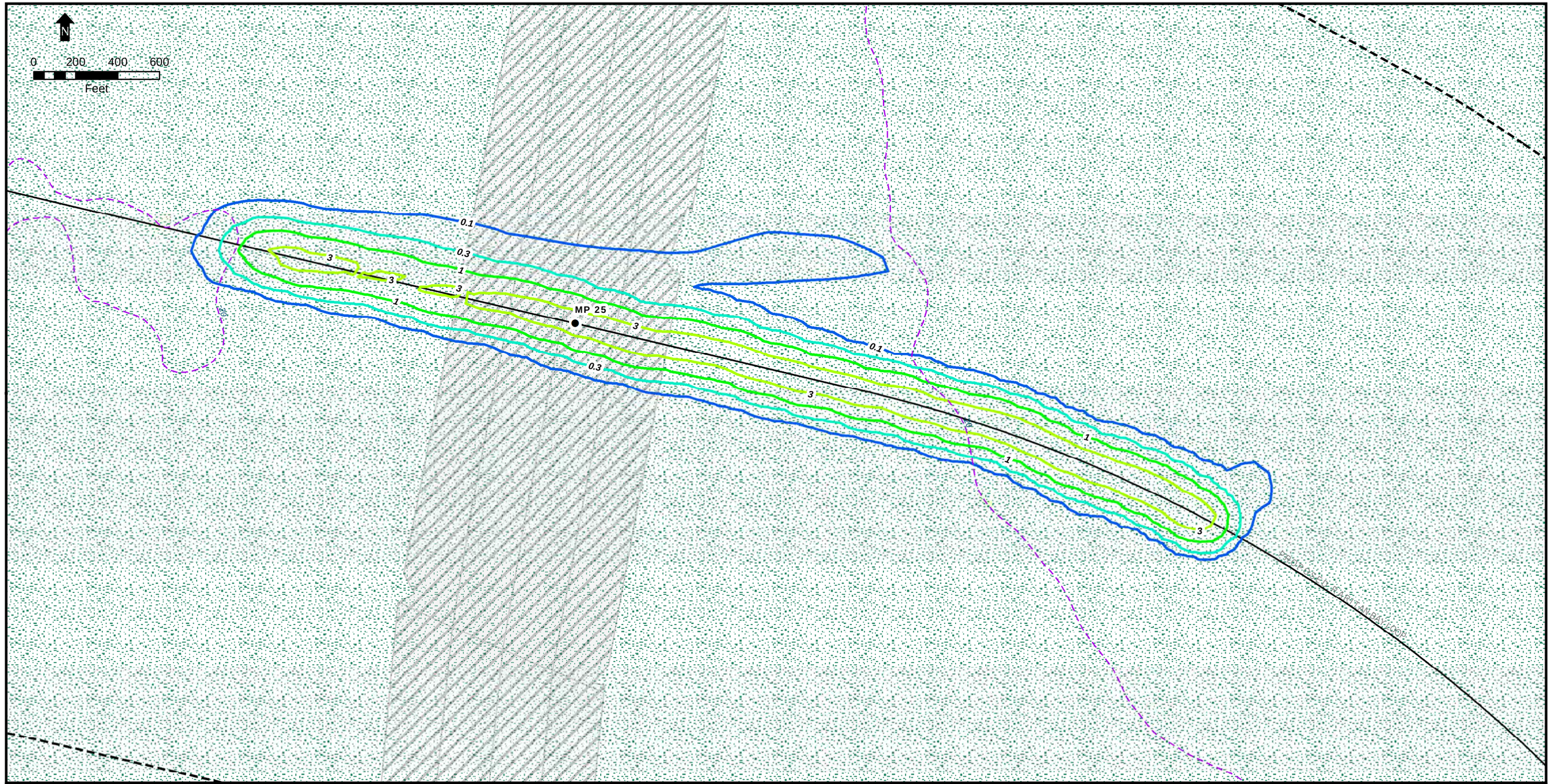
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 91	SHEET 1 OF 1
WO: 1000891		5:31 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C3:
CLAMSHELL DREDGE EXTENDED CHAPEL HILL CHANNEL
DEEP PRISM (15 FT BURIAL) WITH NO SCOW OVERFLOW
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

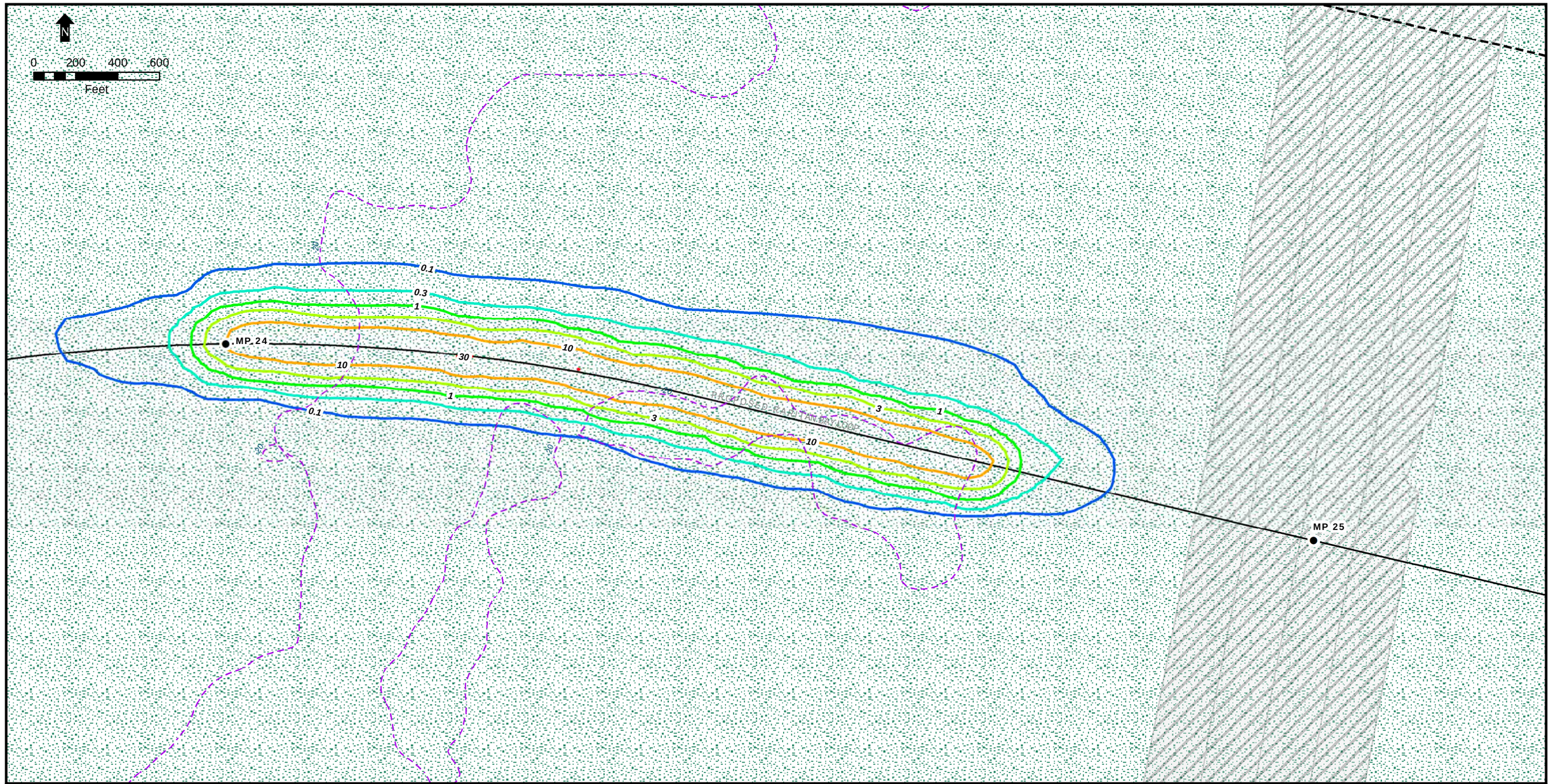
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 92	SHEET 1 OF 1
WO: 1000891		5:35 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C4:
CLAMSHELL DREDGE ANCHORAGE DEEP PRISM (15-FT BURIAL)
WITH SCOW OVERFLOW
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

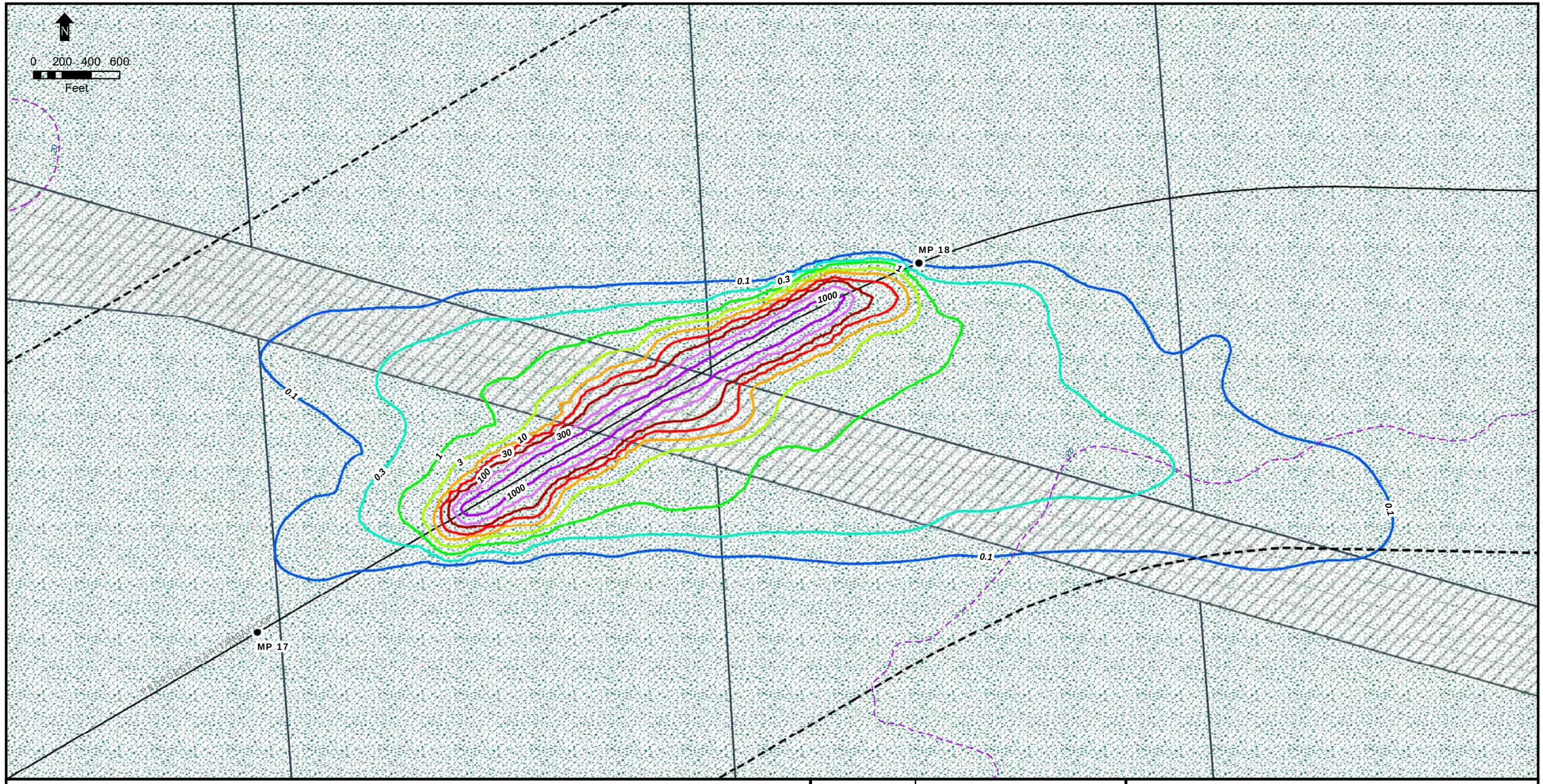
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 93	SHEET 1 OF 1
WO: 1000891		5:35 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C5:
BACKFILL RARITAN CHANNEL BASE-CASE PRISM (UP TO 8-FT BURIAL) @ 7,500 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

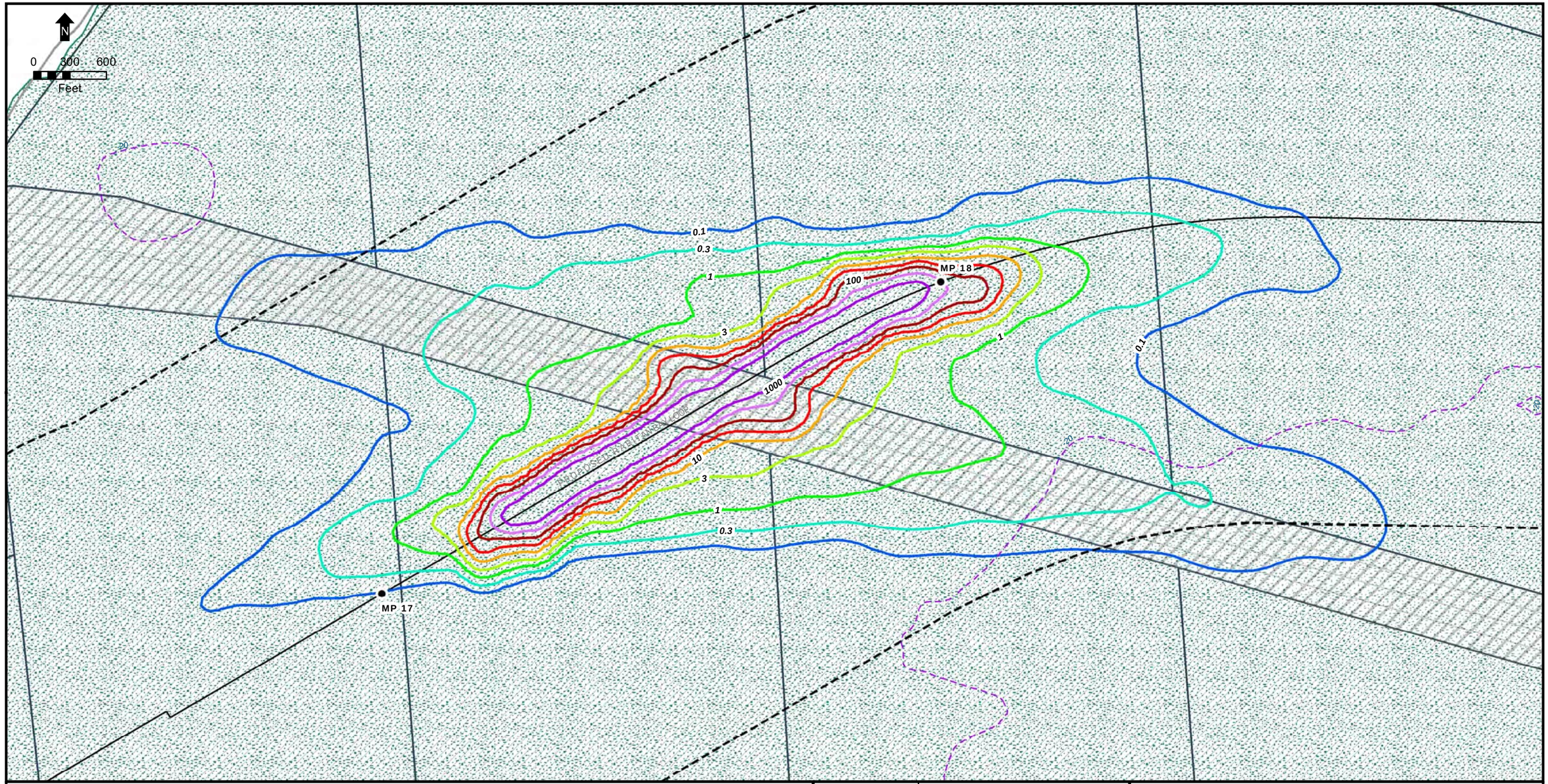
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 94	SHEET 1 OF 1
WO: 1000891		5:36 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C6:
BACKFILL RARITAN CHANNEL DEEP PRISM (15-FT BURIAL)
@ 7,500 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 95	SHEET 1 OF 1
WO: 1000891		5:36 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 24

MP 25

PROPOSED RARITAN BAY LOOP

1
10
0.1
0.3
300
30
3
100
0.3
20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C7:
BACKFILL ANCHORAGE AREA BASE-CASE PRISM (7-FT BURIAL) @ 7,500 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 96	SHEET 1 OF 1
WO: 1000891		5:37 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 300 600

Feet

MP 24

MP 25

0.1

0.3

1

3

10

30

100

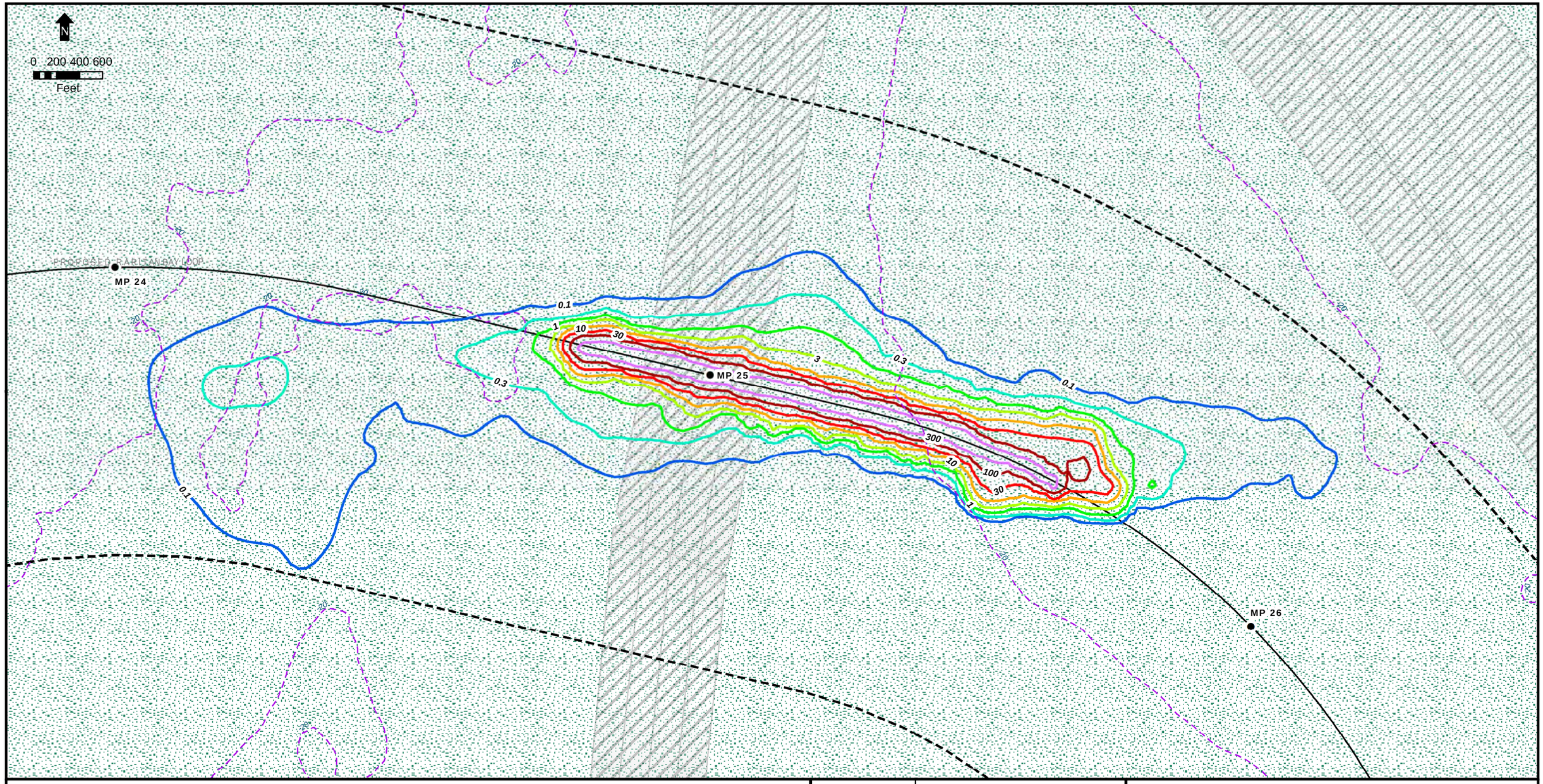
300

1000

20

20

20



Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C9:
BACKFILL EXTENDED CHAPEL HILL CHANNEL PRISM
(UP TO 8-FT BURIAL) @ 7,500 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 98	SHEET 1 OF 1
WO: 1000891		5:40 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 300 600

Feet

PROPOSED RARITAN BAY LOOP

MP 24

MP 25

MP 26

0.1

0.3

1

3

10

30

100

300

1000

20

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C10:
BACKFILL EXTENDED CHAPEL HILL CHANNEL DEEP PRISM (15-FT BURIAL) @ 7,500 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 99	SHEET 1 OF 1
WO: 1000891		5:44 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP 13

PROPOSED RARITAN BAY LOOP

LOWER NY BAY LATERAL

0.1 0.3 1 3 10 30 100 300

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High
- Moderate

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C11:
BACKFILL OF TRENCH BETWEEN MORGAN HDD EXIT
AND THE MIDLINE TIE-IN @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

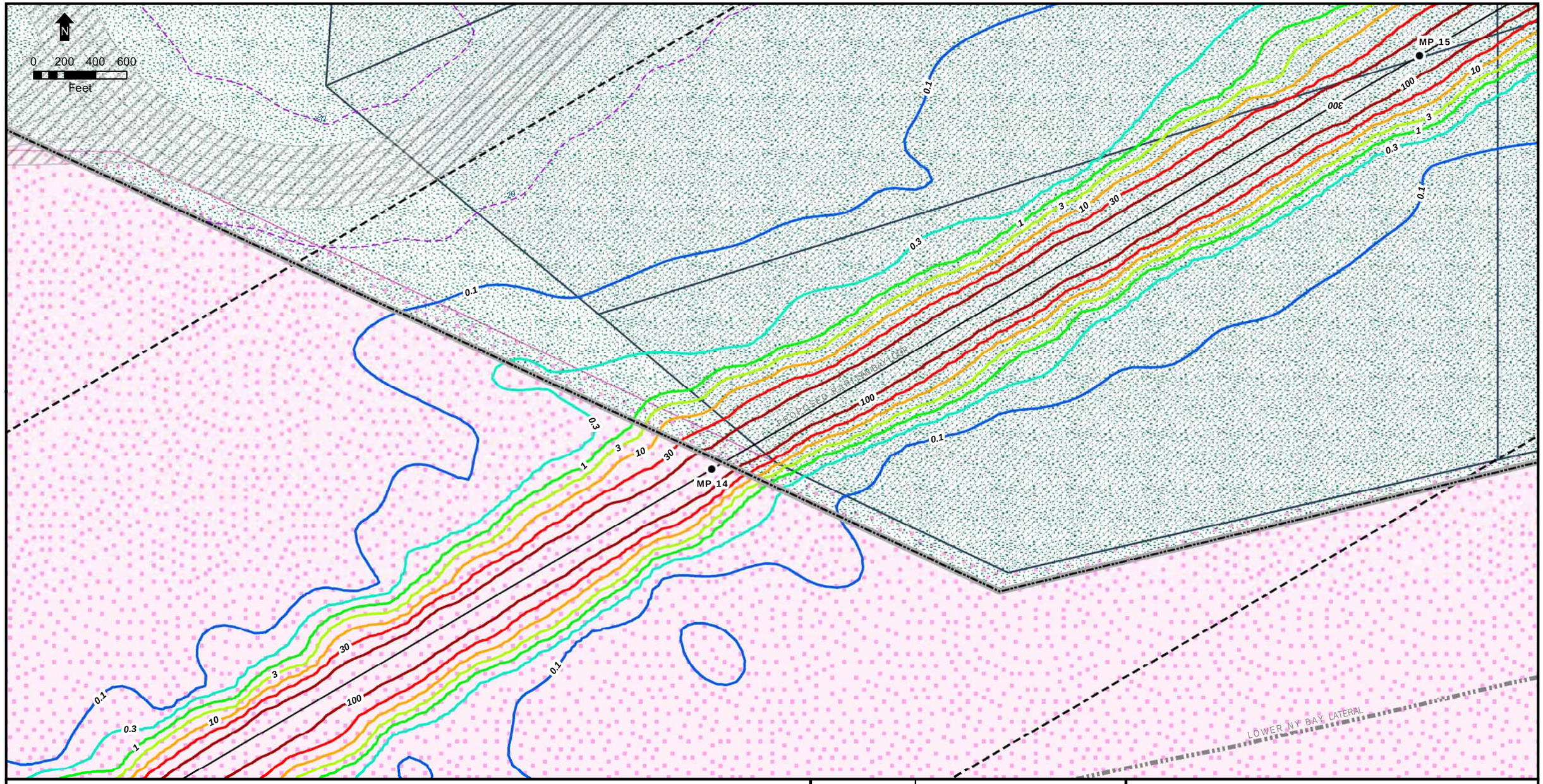
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 100	SHEET 1 OF 4
WO: 1000891		5:50 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water
- Prohibited Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C11:
BACKFILL OF TRENCH BETWEEN MORGAN HDD EXIT AND THE MIDLINE TIE-IN @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

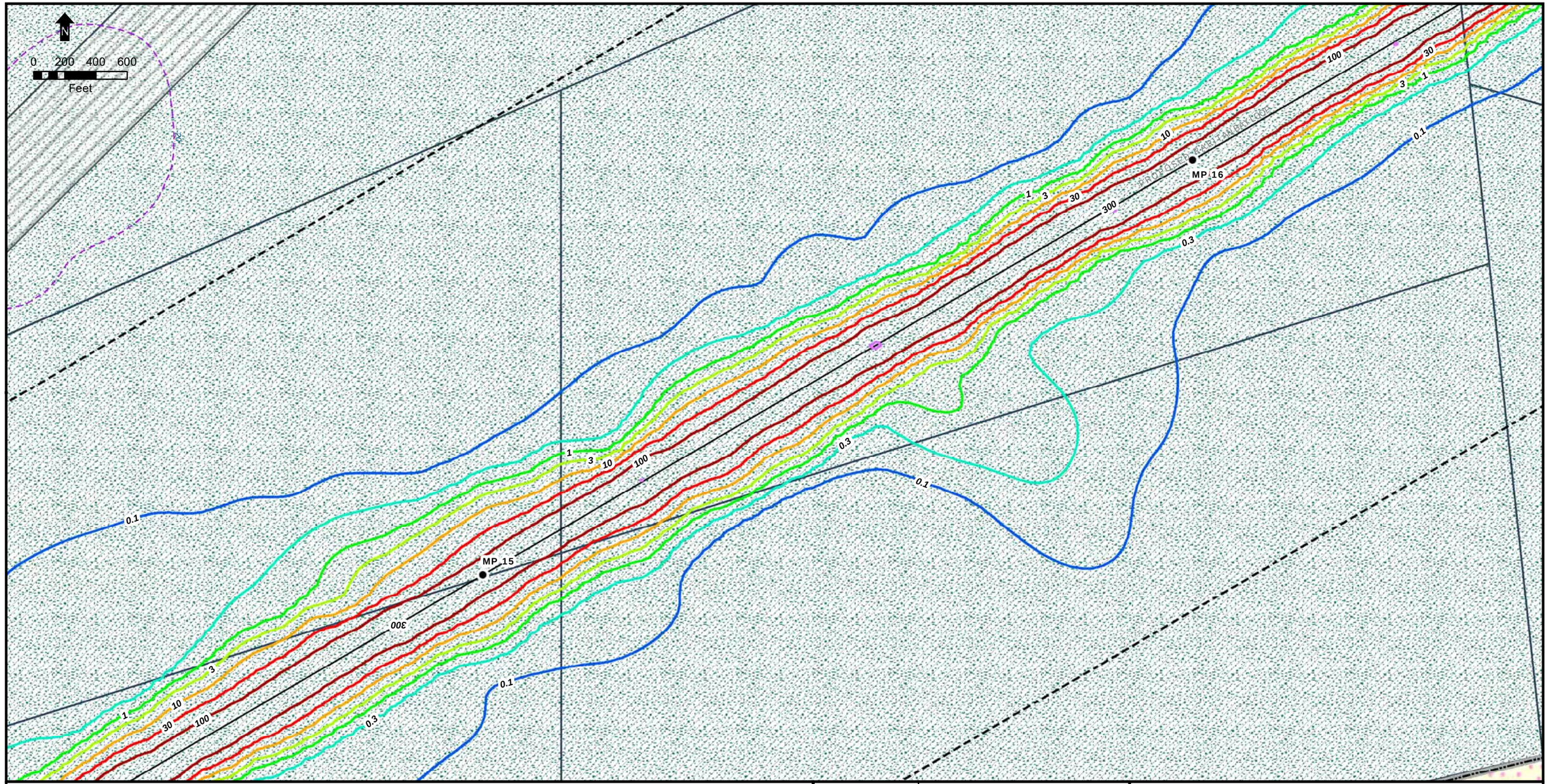
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 101	SHEET 2 OF 4
WO: 1000891		5:51 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

NJ Shellfish Growing Water
- Special Restricted Harvest Area

NJ DEP Hard Clam Relative Abundance (2014)
- High

Estimated Deposition (mm)
- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C11:
BACKFILL OF TRENCH BETWEEN MORGAN HDD EXIT AND THE MIDLINE TIE-IN @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

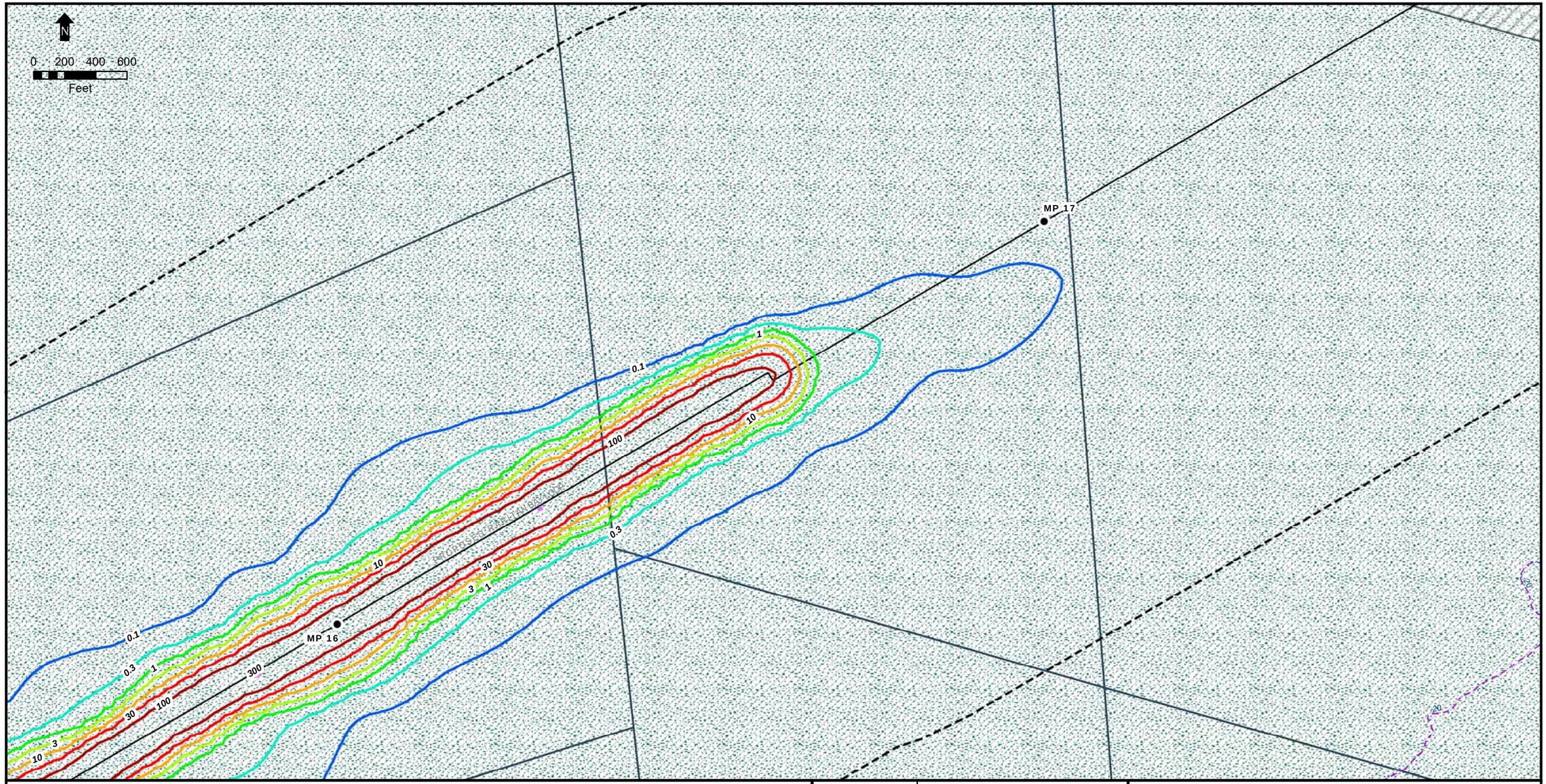
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 102	SHEET 3 OF 4
WO: 1000891		5:52 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C11:
BACKFILL OF TRENCH BETWEEN MORGAN HDD EXIT
AND THE MIDLINE TIE-IN @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 103	SHEET 4 OF 4
WO: 1000891		5:53 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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N

0 200 400 600

Feet

MP_18

MP_17

0.1

0.3

1

3

10

30

100

300

1000

20

PROPOSED RARITAN BAY LOOP

Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NYSDEC Special Permit Harvest Areas – Transplantation
- NY Shellfish Land - Uncertified

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C12:
BACKFILL RARITAN CHANNEL DEEP PRISM (15-FT BURIAL) @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

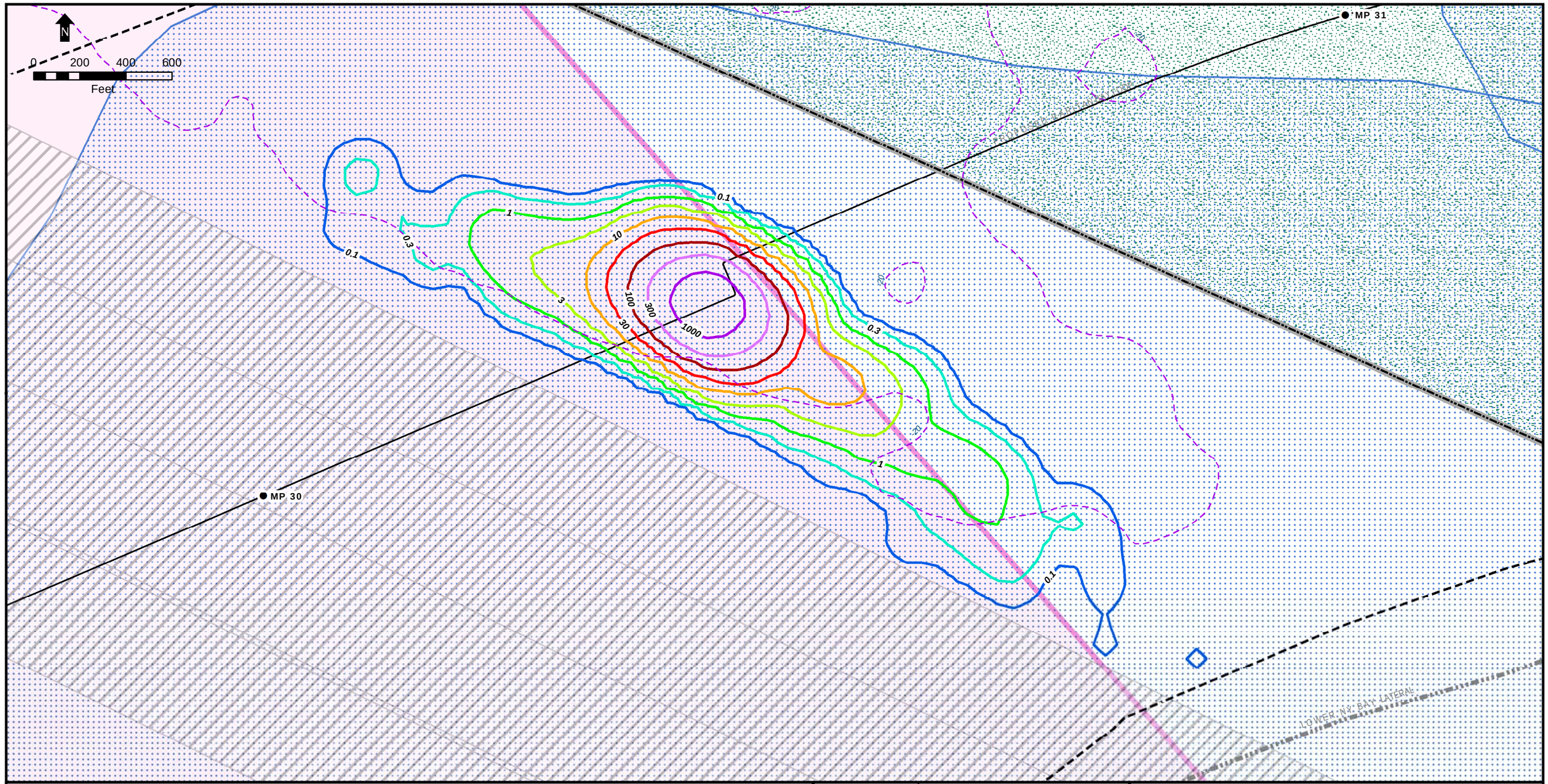
Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 104	SHEET 1 OF 1
WO: 1000891		5:51 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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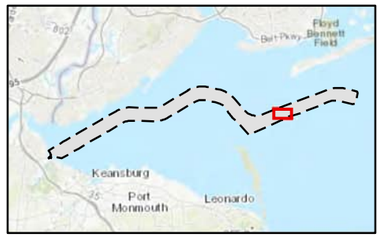


Legend

- Milepost
- Proposed Raritan Bay Loop
- NY/NJ Boundary
- Lower NY Bay Lateral
- Rockaway Delivery Lateral
- Rockaway Reef
- Temporary Workspace
- Maintained Navigation Channel
- 20' Bathymetric Contour
- NJDEP Sport Ocean Fishing Grounds
- NY Shellfish Land - Uncertified
- NJ Shellfish Growing Water
- Prohibited Harvest Area

Estimated Deposition (mm)

- 0.1
- 0.3
- 1
- 3
- 10
- 30
- 100
- 300
- 1000



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
SCENARIO C13:
BACKFILL OF AMBROSE HDD PIT (EAST) AND TIE-IN @ 4,800 CF/HR
NORTHEAST SUPPLY ENHANCEMENT PROJECT
NEW JERSEY, NEW YORK

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	1/30/2019	AL	ISSUED FOR PERMITTING	1000891	MK	SM

DRAWN BY: AL	DATE: 1/30/2019	ISSUE FOR BID: N/A	
CHECKED BY: MK	DATE: 1/30/2019	ISSUE FOR CONSTRUCTION: N/A	Project features ver20
APPROVED BY: SM	DATE: 1/30/2019	DRAWING NUMBER: FIGURE 105	SHEET 1 OF 1
WO: 1000891		5:52 PM 1/30/2019	

Data Sources: Williams 2018; E&E 2018; ESRI 2018; National Audubon Society 2015; NJDEP Digital Data Series Bathymetric Data 2006; NJDEP, DFW, BMF 2003; NJDEP 2016; NOAA ENC, Approach Scale, data downloaded 2016; NYS Department of State, Division of Coastal Resources 1998; USFWS, Southern New England/New York Bight Coastal Ecosystems Program 1997; NYS Office of Information Technology Services GPO 2016; RPS ASA 2018.

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