Office of
Energy Projects

May 2020

Texas Eastern Transmission, LP **Docket No. CP20-30-000**

MIDDLESEX EXTENSION PROJECT

Environmental Assessment

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 1
Texas Eastern Transmission, LP
Middlesex Extension Project
Docket No. CP20-30-000

TO THE INTERESTED PARTY:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Middlesex Extension Project proposed by Texas Eastern Transmission, LP (Texas Eastern) in the above-referenced docket. Texas Eastern requests authorization pursuant to section 7(c) of the Natural Gas Act and part 157 of the Commission's regulations to construct, operate, and maintain natural gas pipeline facilities in Middlesex County, New Jersey. The facilities would provide 264 million cubic feet per day of natural gas transportation to interconnects with Transcontinental Gas Pipe Line Company, LLC's Mainline System and existing Woodbridge Lateral for ultimate delivery to the 725-Megawatt natural gas-fueled combined-cycle Woodbridge Energy Center owned by CPV Shore Holdings, LLC in Woodbridge Township, New Jersey.

The EA assesses the potential environmental effects of construction and operation of the Middlesex Extension Project in accordance with the requirements of the National Environmental Policy Act. The FERC staff concludes that approval of the proposed project, with appropriate mitigation measures, would not constitute a major federal action significantly affecting the quality of the human environment.

The proposed project includes the following facilities:

- 1.54 miles of 20-inch-diameter Line 20 Extension pipeline;
- 0.20 mile (631 feet of Woodbridge Lateral Tie-in, and 494 feet of Mainline E Tie-in) of 16-inch-diameter interconnecting piping;
- Line 20 Tie-in;
- Woodbridge Lateral Tie-in and Mainline E Tie-in;
- metering and regulating facilities;
- pipe inspection tool facilities (launcher, receiver and wire line pull ports); and
- cathodic protection and alternating current mitigation facilities.

The Commission mailed a copy of the *Notice of Availability* to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the project area. The EA is only available in electronic format. It may be viewed and downloaded from the FERC's website (www.ferc.gov), on the Environmental Documents page (https://www.ferc.gov/industries/gas/enviro/eis.asp). In addition, the EA may be accessed by using the eLibrary link on the FERC's website. Click on the eLibrary link (https://www.ferc.gov/docs-filing/elibrary.asp), click on General Search, and enter the docket number in the "Docket Number" field, excluding the last three digits (i.e., CP20-30). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at ferconlinesupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659.

Any person wishing to comment on the EA may do so. Your comments should focus on the EA's disclosure and discussion of potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that the Commission has the opportunity to consider your comments prior to making its decision on this project, it is important that we receive your comments in Washington, DC on or before 5:00 pm Eastern Time on **June 22, 2020.**

For your convenience, there are three methods you can use to file your comments with the Commission. The Commission encourages electronic filing of comments and has staff available to assist you at (866) 208-3676 or ferconlinesupport@ferc.gov. Please carefully follow these instructions so that your comments are properly recorded.

(1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting brief, text-only comments on a project;

(2) You can also file your comments electronically using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You must select the type of filing you are making. If you are filing a comment on a particular project, please select "Comment on a Filing"; or

(3) You can file a paper copy of your comments by mailing them to the following address. Be sure to reference the project docket number (CP20-30-000) with your submission: Kimberly D. Bose, Secretary, Federal

Energy Regulatory Commission, 888 First Street NE, Room 1A, Washington, DC 20426.

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214). Motions to intervene are more fully described at https://www.ferc.gov/resources/guides/how-to.asp. Only intervenors have the right to seek rehearing or judicial review of the Commission's decision. The Commission may grant affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

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

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

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TECHNICAL ABBREVIATIONS AND ACRONYMS

AR	access road
BCC	Birds of Conservation Concern
BPP for HDD	Best Practices Plan for Horizontal Directional Drilling
bgs	below ground surface
BMP	best management practices
BTEX	benzene, toluene, ethylbenzene, xylene
CAA	Clean Air Act
CFR	Code of Federal Regulations
Certificate	Certificate of Public Convenience and Necessity
CO	carbon monoxide
COC	constituents of concern
Conrail	Consolidated Rail Corporation
Commission	Federal Energy Regulatory Commission
CP/AC Mitigation	cathodic protection/alternating current mitigation
CPV	CPV Share Holdings, LLC
CSS	composite soil sample
CVOC	chlorinated volatile organic compound
dBA	decibels on the A-weighted scale
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EI	environmental inspector
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
E&SCP	Erosion and Sediment Control Plan
FRA	Federal Railroad Administration
FSCD	Freehold Soil Conservation District
g	acceleration due to gravity
GHG	greenhouse gases
Greenway	Middlesex Greenway rails-to-trail park
GWQS	Groundwater Quality Standards
HAP	hazardous air pollutant
HDD	horizontal directional drill
L_{dn}	day-night sound level
L_{eq}	24-hour equivalent sound level
LSRP	Licensed Site Remediation Professional
M&R	Metering and Regulating (facility)
MTBE	methyl tertiary-butyl ether
NAAQS	National Ambient Air Quality Standards

NEPA	National Environmental Policy Act
NGA	Natural Gas Act
NHA	National Heritage Area New Jersey Department of Environmental Protection National Register of Historic Places
NJGWS	New Jersey Geological and Water Survey
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	*Notice of Intent to Prepare an Environmental Assessment for the Proposed Middlesex Extension Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Session*
NRHP	National Register of Historic Places
NRCS	National Resources Conservation Service
NSA	noise sensitive area
O_3	ozone
OEP	Office of Energy Projects
PAR	permanent access road
PGA	peak ground acceleration
Plan	FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan*
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
PPC Plan	Preparedness, Prevention, and Contingency Plan for Construction Projects
PTE	potential-to-emit
ppmv	parts per million by volume
Procedures	FERC's *Wetland and Waterbody Construction and Mitigation Procedures*
Project	Middlesex Extension Project
PSD	Prevention of Significant Deterioration
RI	remedial investigation
RQD	Rock Quality Designation
Secretary	Secretary of the Commission
SHPO	State Historic Preservation Officer
SHWS	State Hazardous Waste Site
SO_2	sulfur dioxide
SOC	synthetic organic compound
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
SRP	Site Remediation Program
SSA	sole-source aquifer
TAR	temporary access road
TBA	tertiary butyl alcohol

TMW	temporary monitoring well
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WHPA	Well Head Protection Area

A: PROPOSED ACTION

The staff of the Federal Energy Regulatory Commission (Commission or FERC) prepared this environmental assessment (EA) to assess the environmental impacts of Texas Eastern Transmission, LP (Texas Eastern) proposed Middlesex Extension Project (Project). We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations for implementing NEPA (Title 40 of the Code of Federal Regulations Parts 1500-1508 [40 CFR 1500-1508]), and the Commission's implementing regulations under 18 CFR 380.

The FERC is the lead federal agency for authorizing interstate natural gas transmission facilities under the Natural Gas Act of 1938 (NGA), and the lead federal agency for preparation of this EA.

1.0 INTRODUCTION

On December 19, 2019, Texas Eastern filed an application with the Commission in Docket No. CP20-30-000, pursuant to Section 7(c) of the NGA, to construct and operate natural gas pipeline and meter and regulating facilities in Middlesex County, New Jersey. The proposed project is known as the Middlesex Extension Project (Project) and would provide 264 million cubic feet per day of natural gas transportation to interconnects with Transcontinental Gas Pipe Line Company, LLC's (Transco) mainline system and Transco's existing Woodbridge Lateral for the delivery to the 725-Megawatt natural gas-fueled combined-cycle Woodbridge Energy Center in Woodbridge Township, New Jersey.

The assessment of environmental impacts is an integral part of the Commission's decision on whether to issue Texas Eastern a Certificate of Public Convenience and Necessity (Certificate) to construct and operate the proposed facilities. Our principal purposes in preparing this EA are to:

- identify and assess potential impacts on the natural and human environment which could result from the implementation of the proposed action;
- identify and recommend reasonable alternatives and specific mitigation measures, as necessary, to avoid or minimize project-related environmental impacts; and
- facilitate public involvement in the environmental review process.

[1] "We," "us," and "our" refers to environmental staff of the Commission's Office of Energy Projects.

2.0 PROJECT PURPOSE AND NEED

Texas Eastern's stated purpose of the Project is to provide the necessary infrastructure to enhance the reliability of natural gas service to CPV Shore Holding, LLC's (CPV) Woodbridge Energy Center by providing an alternate access of supply during periods of constraint. The Project would provide up to 264 million cubic feet of firm natural gas transportation service to interconnects with Transco's Mainline system and its Woodbridge Lateral for ultimate delivery to CPV's Woodbridge Energy Center. Texas Eastern states that the Project would provide an alternate means of accessing natural gas supplies from Transco's existing system providing increased reliability.

Under Section 7(c) of the NGA, the Commission determines whether facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decisions on both economic issues, including need, and environmental impacts.

3.0 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

As the lead federal agency for the Project, FERC is required to comply with Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act. These statutes have been considered in the preparation of this EA. The Commission will use this document to consider the environmental impacts that could result if it authorizes the Project. In addition to FERC, other federal, state, and local agencies may use this EA for issuing permits for all or part of the proposed Project. Permits and approvals for the Project are discussed in section A.7.

The topics addressed in this EA include geology and soils; groundwater, surface water, and wetlands; fisheries, vegetation, wildlife, and special status species; cultural resources; land use and visual resources; environmental justice, air quality and noise; reliability and safety; and cumulative impacts. The EA also assesses the no-action alternative, pipeline route alignment alternative, and alternative construction methods in lieu of horizontal directional drilling (HDD). The EA describes the affected environment as it currently exists, discusses the environmental consequences of the Project, and presents our recommended mitigation measures.

3.1 Public Review and Comment

On February 7, 2020, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed Middlesex Extension Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Session* (NOI). The NOI was mailed to about 260 entities including federal, state, and local officials; Native American tribes; agency representatives; potentially affected landowners;[2] and local libraries and

[2]Potentially affected landowners include landowners crossed by the proposed activity, abuts either side of an existing or proposed right-of-way, or contains a residence within 50 feet of a proposed construction work area per 18 CFR 157.6 (d)(2).

newspapers. Comments were requested from the public on specific concerns about the Project or environmental issues that should be considered during preparation of the EA. Additionally, we sponsored a public scoping session in the project area during the formal scoping period to provide the public with the opportunity to comment orally on the Project. The scoping session was held in Edison, New Jersey on February 7, 2020. The transcript of the scoping session was placed into the FERC's public record for the Project and are available for viewing electronically.[3]

Comments on the proposed Project were received from Consolidated Rail Corporation (Conrail), the New Jersey Department of Environmental Protection (NJDEP), the U.S. Environmental Protection Agency (EPA), and from Mr. David Shalit, General Manager of the Metuchen Manor Garden Apartments.

Conrail provided two sets of comments, the first on January 27, 2020, and the second on March 9, 2020. Each letter expressed Conrail's concerns with the Project following its and the Federal Railroad Administration's (FRA) specific safety requirements during pipeline construction and operations on and beneath Conrail's properties and rail lines, and with future safety and reliability of its rail operations. We address Conrail's comments and concerns in section B.8.0 (Reliability and Safety) of this EA.

The NJDEP Office of Permit Coordination and Environmental Review provided recommendations from the state's Land Use Regulation Program; Division of Fish and Wildlife; State Historic Preservation Office; Green Acres Division; New Jersey Geological and Water Survey (NJGWS); Bureau of Evaluation and Air Planning; Division of Air Quality-Bureau of Mobil Sources; Bureau of Non-Point Pollution Control; and Bureau of Surface Water Permitting. The EPA filed comments suggesting that our analysis of Project impacts include a general conformity analysis for all applicable pollutants and precursors for Project construction emissions; an evaluation of alternatives; a comprehensive evaluation of cumulative impacts; an evaluation of impacts on environmental justice communities; and that any revegetation plan require the use of plants that are native to the Project area. All substantive NJDEP and EPA comments are addressed in this EA; specifically, sections A.7.0 (Permits and Authorizations); B.1.0 (Geology); B.2.3 (Mitigation of Soil Impacts); B.3.0 (Water Resources); B.4.0 (Fisheries, Vegetation and Wildlife); B.5.3 (Environmental Justice); B.6.0 (Cultural Resources); B.7.0 (Air Quality and Noise); B.9.0 (Cumulative Impacts); and C (Alternatives).

Mr. Shalit expressed concerns with potential odors associated with venting of Project facilities. These comments are addressed in section B.5.1 (Land Use).

[3]Accession number 20200227-4003

3.2 Proposed Facilities

The Project involves construction of:

- 1.54 miles of 20-inch-diameter Line 20 Extension pipeline;
- 0.20 mile (631 feet of Woodbridge Lateral Tie-in, and 494 feet of Mainline E Tie-in) of 16-inch-diameter interconnecting piping;
- Line 20 Tie-in;[4]
- Woodbridge Lateral Tie-in and Mainline E Tie-in;
- Transco metering and regulating (M&R) facilities;
- pipe inspection tool facilities (pig launcher, receiver and wire line pull ports);[5] and
- cathodic protection and alternating current mitigation (CP/AC Mitigation) facilities.

Specifically, Texas Eastern would construct a 20-inch-diameter natural gas pipeline connecting Texas Eastern's existing Line 20 to the proposed Transco M&R facility (20-inch Extension). Additionally, Texas Eastern would construct 16-inch-diameter connecting piping from the outlet of the proposed Transco M&R to the proposed tie-in locations with the Woodbridge Lateral (Woodbridge Lateral Tie-in) and the Transco Mainline E (Mainline E Tie-in).

The general location of the proposed Project facilities is shown below on figure 1. United States Geological Survey (USGS) project site locations maps are provided in appendix A.

[4] Texas Eastern would also replace an existing Remote Terminal Unit (RTU) building with a new building to accmodate the RTUs for both the Line 20-B lateral interconnection and the proposed Line 20 Tie-in. No changes to the construction right-of-way are required for this activity.

[5] A "pig" is a tool that the pipeline company inserts into and pushes through the pipeline for cleaning the pipeline, conducting internal inspections, or other purposes.

Figure 1. Location of Proposed Facilities

4.0 LAND REQUIREMENTS

Construction of the Project would require about 20.5 acres of land. Permanent (operational) impacts associated with permanent pipeline easements, installation of proposed aboveground facilities, and permanent access roads would total about 5.5 acres. Following construction, all areas of temporary disturbance would be graded, restored to pre-construction contours, and revegetated.

Land requirements for construction and operation of the proposed Project facilities are summarized in table 1.

Table 1. Summary of Project Land Requirements

Facility	Land Affected During Construction (Acres)[a]	Land Affected During Operation (Acres)[b]
Pipeline	10.7	2.6
Aboveground Facilities	6.6	2.3
Access Roads[c]	0.2	0.6
Contractor Yards	3.1	0.0
Total	**20.5**	**5.5**

a. Land Affected During Construction is within the construction right-of-way and includes temporary workspace and permanent easements.
b. Pipeline and aboveground facilities share similar land during operation within the permanent easement.
c. Land Affected During Operation for permanent access roads include the area beyond pipeline and aboveground facility easements.

5.0 CONSTRUCTION SCHEDULE

Pending receipt of all necessary regulatory approvals, Texas Eastern anticipates commencing construction of the Project in January 2021 and placing all Project facilities into service in September 2021.

In general, construction activities are scheduled for between 7:00 am and 7:00 pm Monday through Saturday. However, Texas Eastern states that extended work hours may be necessary due to safety precautions or circumstances that require continuous work activities, such as crossing of two railroad corridors with the Northern HDD, which, according to Conrail, may require continuous operation due to potential requirements of the passenger railroad when crossing the Conrail facilities. We discuss the Project working hours further in section B.7.10 of this EA.

6.0 CONSTRUCTION, OPERATION, AND MAINTENANCE PROCEDURES

Texas Eastern would design, construct, operate, and maintain the Project in accordance with the U.S. Department of Transportation's (DOT) *Minimum Federal Safety Standards* in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*; the Commission's Siting and Maintenance Requirements at 18 CFR 380.15; and other applicable federal and state safety regulations.

6.1 Project Facilities

20-inch Extension

The HDD and conventional trench construction methods would be used to install the 20-inch Extension pipeline, including two conventional trench sections and two HDD sections (Northern HDD and Southern HDD). Approximately 81 percent of the 1.54-mile-long 20-inch Extension pipeline would be installed using the HDD construction method. Texas Eastern would co-locate within or locate the 20-inch Extension adjacent to an existing utility right-of-way for its entire length, and it would cross two railroad corridors and seven roadways. All railroads and roadways would be crossed by the two HDDs.

Texas Eastern would construct 575 feet of conventional trench section in a northerly direction from its proposed pig launcher facility at the connection with the existing Line 20 to the proposed Northern HDD entry location. This pipeline would be constructed with a minimum depth of cover of 4 feet. From the Northern HDD entry location, the pipeline would then progress in a southerly direction along an existing overhead electrical corridor that is bound on each side by residential developments. The pipeline would pass beneath a paved parking area, railway tracks, and Oakwood Avenue. From north to south, starting approximately 400 feet south of the entry point, the topography along the alignment drops quickly, falling approximately 45 feet to the railroad tracks. The topography then climbs slowly to the south finally reaching an elevation approximately 1 foot higher than the entry elevation (see appendices B and C).

Texas Eastern states the 575 feet of conventional lay distance is necessary for the design of the HDD path, in order to intercept consolidated bedrock in as short a distance as possible while maintaining pipe bend radii design specifications, and to meet Conrail's minimum crossing depth safety requirements beneath its rail facilities[6]. Texas Eastern also designed the HDD path to accommodate the sharp elevation decline to the south of Line 20 where the railroad tracks are located. At the track location, the top of pipe depth would be 86 feet below the bottom of the railroad tracks, where it would intercept bedrock. Also, with the location of Line 20 in relation to the railroad, the Northern HDD

[6] Conrail's HDD Guidelines provides for a minimum depth of cover of 40 feet beneath its rail lines.

would be below the existing Line 20 pipeline tie in at a depth of approximately 85 feet below ground surface (bgs).

Texas Eastern would construct the second conventional trench section between Oakwood Avenue and Ped Place and would connect the Northern HDD and the Southern HDD. CP/AC Mitigation systems consisting of small test stations and rectifiers would be installed above and below ground within the permanent easement along the conventional trench pipeline sections.

The 20-inch-diameter Southern HDD alignment would run from south to north along an existing overhead electrical corridor that is bound on each side by residential developments. The crossing would pass beneath U.S. Route 1, Woodbridge Avenue, and multiple residential side streets. The topography is generally flat with a slight rise to the north (see appendices B and C).

Woodbridge Lateral Tie-in Piping

The Woodbridge Lateral Tie-in Piping would extend from the outlet of the Transco M&R to the Woodbridge Lateral Tie-in. Texas Eastern would install the connection piping using the conventional trench method (appendix C).

Mainline E Tie-in Piping

The Mainline E Tie-in Piping would extend from the outlet of the Transco M&R to the Mainline E Tie-in. Use of the conventional trench method is proposed to install the connecting piping. Texas Eastern would install the Mainline E Tie-in Piping along the alignment and in the same permanent easement as the Southern HDD (appendix C).

The Project's proposed installation methods and lengths of the 20-inch Extension, the Woodbridge Lateral Tie- in piping, and the Mainline E Tie-in Piping are shown in table 2.

Texas Eastern would locate Project construction workspace at each end of the Northern and Southern HDDs, and certain portions of the construction right-of-way workspace would be as much as 400 feet in width.

Aboveground Facilities

The planned Project aboveground facilities would include the Line 20 Tie-in, the Transco M&R, the Woodbridge Lateral Tie-in and the Mainline E Tie-in.

Table 2. Pipeline Installation Methods, Lengths and Location						
Pipeline Facilities	**Construction Method**	**Municipality[a]**	**Start MP[b]**	**End MP[b]**	**Miles**	**Feet**
20-inch Extension	Conventional Trench	Metuchen Borough	0.00	0.13	0.13	685
	Northern HDD	Metuchen Borough	0.13	0.50	0.37	1,944
		Edison Township	0.50	0.84	0.35	1,831
	Conventional Trench	Edison Township	0.84	1.00	0.15	816
	Southern HDD	Edison Township	1.00	1.54	0.54	2,864
Woodbridge Lateral Tie-in Piping	Conventional Trench	Edison Township	N/A	N/A	0.12	631
Mainline E Tie-in Piping	Conventional Trench	Edison Township	N/A	N/A	0.09	494
Total Proposed Pipeline Length					1.75	9,265

a. All facilities are proposed in Middlesex County, New Jersey
b. MP = Milepost. N/A = Not Applicable

Line 20 Tie-In

The Line 20 Tie-in is a proposed aboveground facility is proposed where the 20-inch Extension connects with Line 20, situated north of Line 20 in an area adjacent to an existing utility right-of-way. The Line 20 Tie-in would include a tap valve, a communication remote terminal unit building, and a pig launcher facility, as well as other related appurtenant equipment. These components would also be enclosed within a security fence.

Transco M&R Station

The Transco M&R is a proposed aboveground facility at the southern extent of the 20-inch Extension, north of the Middlesex Greenway (Greenway) and west of Starkin Road, within an existing utility right-of-way. The Transco M&R Station would include gas measurement and regulation facilities, including associated remote thermal unit and gas analyzer buildings, a blow down valve, and a gas filter separator, as well as other appurtenant equipment. Additionally, a pig receiver associated with the 20-inch Extension would be within the Transco M&R Station. These components would be enclosed within security fence(s). The Woodbridge Lateral Tie-in Piping and Mainline E Tie-in Piping are proposed at the outlet of the Transco M&R Station.

Woodbridge Lateral Tie-in and Mainline E Tie-in

Two tie-in facilities with appurtenances are proposed: the Woodbridge Lateral Tie-in and the Mainline E Tie-in. The tie-in facilities would be owned and operated by Transco. Texas Eastern would install wire line pull ports, consisting of an aboveground flange to facilitate pipeline integrity inspections. These facilities, would be owned and operated by Texas Eastern, and would be co-located with the Woodbridge Lateral Tie-in and Mainline E Tie-in.

Access Roads

One temporary access road (TAR 0.2) would be used to allow access during construction along the proposed Northern HDD drill path where access is restricted between the freight railroad and passenger railroad. TAR 0.2 would primarily be used as a pedestrian path to monitor the HDD for potential inadvertent returns. No earth disturbance or change to the groundcover is proposed across the residential property. Texas Eastern found that no wetlands or waterbodies would be impacted by use of this access road.

Five 20-foot-wide permanent access roads (PAR) are proposed and all are within the proposed construction right-of-way. Each proposed PAR is described below and summarized in table 3:

- PAR 0.0 would begin at Middlesex Avenue and would provide access to the Line 20 Tie-in and CP/AC Mitigation system components by use of an existing gravel entrance maintained by the utility right-of-way operators and a paved access road maintained by the adjacent apartment complex. A new graveled PAR segment would be created from the existing pavement to the proposed fenced Line 20 Tie-in facility.

- PAR 0.7 begins at Oakland Avenue and would provide access to the pipeline permanent easement and the proposed CP/AC Mitigation system components by use of an existing gravel entrance maintained by the utility right-of-way operators and a grassy area. The PAR 0.7 segment from the existing gravel entrance to the permanent easement would be restored to the existing grass ground cover and maintained by the utility right-of-way operator.

- PAR 1.0 begins at Ped Place and would provide access to the proposed permanent easement and the CP/AC Mitigation system components by use of an existing gravel entrance maintained by the utility right-of-way operators. PAR 1.0 would avoid residential outbuildings and landscaping that exist within the utility right-of-way. The PAR 1.0 segment from the gravel entrance to the permanent easement would be restored to the existing grass ground cover and maintained by the utility right-of-way operator.

- PAR 1.5 begins at Starkin Road and would provide access to the Transco M&R, Mainline E Tie-in and CP/AC Mitigation system components by use of an existing gravel road maintained by the utility right-of-way operators. From the point where PAR 1.5 diverges from the gravel access road to the Mainline E Tie-in, the land would be restored to the existing grass ground cover and maintained by the utility right-of-way operator.
- PAR 1.7 begins at Pierson Road and would provide access to the Woodbridge Lateral Tie-in by use of an existing gravel road maintained by others.

Table 3. Summary of Temporary and Permanent Access Roads

Access Road	Municipality	Access Road Length (feet)	Description
TAR 0.2	Metuchen Borough	491	Along the proposed Northern HDD drill path where access is restricted between the freight railroad and passenger railroad
PAR 0.0	Metuchen Borough	611	Near MP[a] 0.10. Provides access from Middlesex Avenue to the Line 20 Tie-in facility and CP/AC Mitigation system rectifiers
PAR 0.7	Edison Township	785	Near MP 0.70. Provides access from Oakwood Avenue to the permanent easement and CP/AC Mitigation system rectifiers
PAR 1.0	Edison Township	229	Near MP 1.00. Provides access from Ped Place to the permanent easement and CP/AC Mitigation system rectifiers
PAR 1.5	Edison Township	556	Near MP 1.55. Provides access from Starkin Road to the Transco M&R facility, Mainline E Tie-in and CP/AC Mitigation system rectifiers
PAR 1.7	Edison Township	280	Provides access from Pierson Road to the Woodbridge Lateral Tie-in

a. MP = Milepost.

Construction Ware Yards

To support construction of the proposed Project, Texas Eastern would temporarily use two properties it owns as off-site contractor ware yards. These include the Linden M&R Station and the Linden Compressor Station (Linden CS) in Linden City, Union County, New Jersey. No land disturbance would be required to utilize these properties for construction support.

6.2 Construction Procedures

Texas Eastern would construct, restore, and maintain the Project in accordance with its Erosion and Sediment Control Plan (E&SCP) that includes the requirements of FERC's *Upland Erosion Control, Revegetation and Maintenance Plan* (FERC Plan) (FERC 2013a) and *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures) [7] (FERC 2013b) with the exception of certain specified alternative measures, or deviations. Texas Eastern proposed deviation from our Procedures are summarized below:

Wetland and Waterbody Construction and Mitigation Procedures

VI.B.1a - Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

The construction workspace required for installation of the Woodbridge Lateral Tie-in Piping is proposed within 5 feet of Wetland W-GH-001. Texas Eastern proposes the workspace in close proximity to the wetland to avoid aboveground and below ground electric, natural gas, communication infrastructure, and a support pier for the elevated section of Middlesex Greenway, forcing the Woodbridge Lateral Tie-in pipeline and the associated workspace south toward the wetland.

We have reviewed this site-specific justification to our Procedures and find it acceptable.

6.3 Conventional Trench Installation Procedures

Trenching, or ditching, involves the linear excavation of soil to a depth and width needed to install the pipeline safely and to meet the regulatory requirements and industry standards for depth of cover. The width of the trench is typically about 12 inches wider than the diameter of the pipe at the bottom of the trench and would gradually increase from bottom to top to promote stability. Depth of the trench is determined by the minimum cover requirements to the top of the pipe in accordance with DOT regulations and applicable state requirements. Deeper excavations may be needed to meet state specific requirements for wetland and waterbody crossings as well as accommodate the crossing of subsurface utilities, including pipelines. Excavated material is typically placed adjacent to the trench on the opposite side from where the pipeline sections would be welded together, lifted, and then set into the trench. Although trenching is typically

[7] The FERC Plan and Procedures are a set of baseline construction and mitigation measures developed to minimize the potential environmental impacts of construction on upland areas, wetlands, and waterbodies. The Plan and Procedures can be viewed on the FERC website at: www.ferc.gov/industries/gas/enviro/plan.pdf and www.ferc.gov/industries/gas/enviro/procedures.pdf.

the most common pipe installation method, it would not be used extensively on this Project (see table 3).

Blasting

Blasting would not be required to install the pipeline or the aboveground facilities.

Stringing

Stringing involves placement of pipe sections in a row to allow for welding; typically, on the working side of the trench where vehicle travel occurs or within a drill string workspace for HDD installation methods. Stringing is coordinated in advance of the installation to ensure the pipe is not exposed on the construction right-of-way for long periods of time. Pipe segments would be brought to the construction right-of-way from the off-site storage location and then moved into position along the trench by the appropriate equipment. Texas Eastern would arrange pipe joints to promote safe access for bending and welding.

Bending

When field conditions require a specific pipe bend angle, Texas Eastern would bend the straight sections of pipe using equipment designed for this process. This typically occurs when horizontal angles are needed to avoid existing utilities or other features.

Welding and Coating

Welders and welding procedures would be qualified in accordance with DOT regulations. Texas Eastern would verify all welds by a non-destructive testing method to ensure compliance with code requirements. Once a weld has been tested, inspected and approved, Texas Eastern would coat the welded area with appropriate field joint system (e.g., epoxy) prior to lowering-in.

Lowering-in and Backfill

Following welding, the pipe sections would be lowered into the trench using counter-balanced side booms or other appropriate equipment. The pipe would typically be placed on padding in the trench made up of screened subsoil or stacked sandbags. Once the pipe is lowered in, welded and coated, the trench is backfilled, first covering the pipe with screened subsoil free of rocks to protect the pipe coating during backfill. The remainder of the trench would be backfilled with the subsoil. Texas Eastern would replace the topsoil across the right-of-way during the restoration process prior to seeding and mulching.

6.4 Specialized Construction Techniques

Horizontal Directional Drill

HDD is a trenchless pipeline installation method used when the crossing length is relatively long and where conventional trenching is not feasible due to the availability of workspace and/or avoidance of roadways, railroads, subsurface utilities, or sensitive resources. The HDD method involves drilling a pilot hole then enlarging the hole through successive reaming passes until the hole is of sufficient diameter to accommodate the pipe. Throughout the process of drilling and reaming, drilling fluids are circulated through the drill stem to lubricate the cutting head, support the hole's structure, and to remove material cuttings (see Section B.1.4). The drilling fluid is primarily a bentonite clay and water mixture (typically 95-percent water), and may include small amounts of additives to manage site-specific geologic conditions. Once the hole is of sufficient diameter to accommodate the pipe, the pipeline is through the hole.

As discussed above, about 81-percent of the 20-inch Extension pipeline would be constructed utilizing HDD in two segments; the Northern HDD (3,775 feet long), and the southern HDD (2,864 feet long). Construction right-of-way is required at each end of the HDDs to accommodate equipment. The entry side equipment typically includes a drill rig, control cab, drill pipe storage, tool storage trailers, power generators, bentonite storage, bentonite slurry mixing equipment, slurry pump, cuttings separation equipment, cuttings return/settlement pit, water trucks and water storage, and other construction equipment necessary to support the operation. The exit side is the location where the pipeline "pull-string" is fabricated and pulled back through the reamed hole. Typical exit side equipment includes a slurry containment pit, cuttings return/settlement pit, cuttings separation and slurry reclamation equipment, and other construction equipment necessary to support the operation.

Texas Eastern states that the intercept drilling method may be used for both the Northern HDD and the Southern HDD. An HDD intercept method is conducted by placing a drill rig and associated equipment at both ends of the HDD and drilling toward one another until the pilot hole meets. This method is sometimes used to reduce downhole drilling mud pressure and stresses on the drilling equipment and would require similar equipment on both sides of the HDD during drilling of the pilot hole. Once this connection occurs, reaming would then be completed from one side of the drill. Using this method, multiple pipe sections, or pull-strings, would be fabricated prior to pullback. Once the pipeline is pulled back through the hole, the Northern HDD and the Southern HDD would be connected using conventional trenching installation.

To minimize potential impacts from constructing the HDDs, Texas Eastern developed a *Final HDD design Report* March 6, 2020[8]; and also developed a *Best Practices Plan for Horizontal Directional Drill Operations* (BPP for HDD) in

[8] J.D. Hair Associates February 28, 2020. HDD Design Report Middlesex Extension Project Revision 4.

accordance with our *Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response, and Contingency Plans* (FERC 2019). These are discussed further in section B.1.

6.5 General Aboveground Facility Construction

Once Texas Eastern would clear and grade the aboveground and ancillary facility site locations, excavation would begin for their installation. Texas Eastern would strip topsoil, if present, from the area prior to grading and excavation and re-use the topsoil during final restoration. Additional clean soil may be imported from approved sources to achieve the desired site/foundation grade.

Texas Eastern would construct the foundations and supports of poured reinforced concrete. Much of the equipment and buildings would be pre-fabricated off site and shipped to the site on skids for installation and tie-in. All pipe connections would be flanged or welded. Texas Eastern would coat exposed piping and welds to protect against corrosion. Buildings and equipment would be installed on the concrete foundations or spread footings. Texas Eastern would ensure that buildings are adequately ventilated, equipped with lighting and insulation, if required, and have the minimum number of doorways necessary to provide unobstructed access for personnel. Steel building structures would have a durable coating system applied to protect them from the outside elements.

Hydrostatic Test Water and Discharge

In compliance with the DOT regulations (49 CFR 192, Subpart J), Texas Eastern would hydrostatically pressure test the facilities prior to placing them into service to ensure integrity. Hydrostatic test water is expected to be supplied from a municipal source(s). Hydrostatic testing would be completed for the each of the HDD pull strings prior to pullback and the full pipeline would be hydrostatically tested prior to final tie-in.

6.6 Operation and Maintenance

Following construction, Texas Eastern would operate and maintain the newly constructed Project facilities in accordance DOT's regulations in 49 CFR 192, and pursuant to the provisions of the Natural Gas Pipeline Safety Act of 1968, as amended. If necessary, Texas Eastern would install and maintain permanent structural controls to accomplish maximum stabilization, prevent erosion, and control sedimentation. Permanent erosion controls would be installed as needed to prevent siltation into waterbodies and movement of soils downslope of the construction area (e.g., swales).

6.7 Non-Jurisdictional Facilities

No non-jurisdictional facilities are associated with the Project; however, we note that Transco would construct associated facilities at the proposed Woodbridge Lateral Tie-in and the Mainline E Tie-in. Texas Eastern would construct valves and inspection

tool appurtenances at the tie-ins with Transco's facilities. Transco would construct, own, operate, and maintain tap valve assemblies, overpressure protection facilities, and other appurtenant facilities associated with the tie-ins to its pipelines. Transco would undertake this work pursuant to its Blanket Certificate authority issued in FERC Docket No. CP82-426. Transco's facilities are addressed in the context of cumulative impacts in section B.9 of this EA.

As discussed above in section A.2.0, Texas Eastern's stated purpose of the Project is to provide the necessary infrastructure to enhance the reliability of natural gas service to CPV's existing Woodbridge Energy Center by providing an alternate access of supply during periods of constraint. There are no anticipated changes in CPV's natural gas consumption as a result of construction of the Project.

7.0 PERMITS, APPROVALS, AND REGULATORY CONSULTATIONS

Table 4 lists the major federal, state, and local permits, approvals, and consultations for construction and operation of the Project and provides the current status of each. Texas Eastern would be responsible for obtaining and abiding by all permits and approvals required for construction and operation of the Project regardless if they appear in the table.

Table 4. Permits, and Authorizations

Agency	Permit/Clearance	Status
FEDERAL		
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity to construct, install, own, operate, and maintain the Projects under Section 7 (c) of the NGA (15 USC § 717f (c)).	Application filed, December 2019.
U.S. Army Corps of Engineers	Clean Water Act Section 404	Obtained through NJDEP Freshwater Wetland Permit Approval Process.
U.S. Department of the Interior, U.S. Fish and Wildlife Service (USFWS)	Consultation under Section 7 of the ESA; the Migratory Bird Treaty Act; the Bald and Golden Eagle Protection Act; and the Fish and Wildlife Coordination Act (16 USC § 661 et seq.).	Information for Planning and Consultation performed on October 2, 2019. USFWS response received January 15, 2020. Consultation ongoing.
NEW JERSEY		
New Jersey Department of Environmental Protection – Division of Land Use Regulation	NJDEP Freshwater Wetland Permits: GP 2 – Underground Utility Lines GP 10A – Very Minor Roadway Clean Water Act Section 401 Water Quality Certification NJDEP Flood Hazard Area Control Act Individual Permit	Wetland and waterbody delineation complete; permit applications to be submitted in April 2020; 401 Certification anticipated September 30, 2020.

Table 4. Permits, and Authorizations		
Agency	**Permit/Clearance**	**Status**
New Jersey Department of Environmental Protection – Division of Water Quality	Freehold Soil Conservation District Erosion and Sediment Control Plan Certification required for New Jersey Pollution Discharge Elimination System General Permit (5G3)	5G3 to be submitted September 1, 2020. Authorization anticipated September 30, 2020.
New Jersey Department of Environmental Protection – Division of Water Quality Bureau of Water Allocation and Well Permitting	NJDEP Water Allocation/Dewatering Permits	To be submitted September 1, 2020. Authorization anticipated September 30, 2020.
New Jersey Department of Environmental Protection – Division of Water Quality Bureau of Surface Water Permitting	NJDEP Water Discharge Permits – Trench Dewatering and Hydrostatic Discharge	To be submitted September 1, 2020. Authorization anticipated September 30, 2020.
New Jersey Department of Environmental Protection – Land Use Management	Coastal Zone Consistency Review	Applicability pending
New Jersey Historic Preservation Office	National Historic Preservation Act - Section 106	Concurrence of no adverse impacts received January 27, 2020.
New Jersey Department of Environmental Protection	Diversion of Parkland Approval	Pre-application with NJDEP Green Acres Program filed on April 21, 2020. Pending
County and Local/Municipal		
Edison Township	Request to Edison Township for discharges to its stormwater system	Approval to discharge hydrostatic test water into the Edison Stormwater System received April 6, 2020.
Middlesex County	Approval to Cross Greenway rails-to-trail park	Once authorized by the NJDEP Green Acres Program, Texas Eastern will submit the final application for the diversion to Middlesex County for approval. Pending.

B: ENVIRONMENTAL ANALYSIS

In the following sections, we address the direct and indirect construction and operational impacts, and proposed mitigation measures to minimize or avoid impacts for each resource. When considering the environmental consequences of the Project, the duration and significance of any potential impacts are described according to the following four levels: temporary, short-term, long-term, and permanent.

Temporary impacts generally occur during construction, with the resources returning to pre-construction conditions almost immediately. Short-term impacts could continue for up to three years following construction. Long-term impacts would require more than three years to recover, but eventually would recover to pre-construction conditions. Permanent impacts could occur because of activities that modify resources to the extent that they may not return to pre-construction conditions during the life of the Project, such as with the construction of an aboveground facility. An impact would be considered significant if it would result in a substantial adverse change in the physical environment. In this section, we address direct and indirect effects collectively, by resource including:

- Geology;
- Soils;
- Water Resources;
- Fisheries, Vegetation and Wildlife;
- Land Use and Visual Resources;
- Cultural Resources;
- Air Quality and Noise;
- Reliability and Safety; and
- Cumulative Impacts.

The analysis in this EA is based upon Texas Eastern's application and supplemental filings and our experience with the construction and operation of natural gas infrastructure. However, if the Project is approved and proceeds to the construction phase, it is not uncommon for a project proponent to require modifications (e.g., minor changes in workspace configurations). These changes are often identified by a company once on-the-ground implementation work is initiated. Any Project modifications would be subject to review and approval from FERC's Director of the Office of Energy Projects (OEP) and any other permitting/authorizing agencies with jurisdiction.

1.0 GEOLOGY

The proposed Middlesex Extension Project is entirely within the Piedmont Physiographic Province, just north of the Fall Line separating consolidated bedrock of the Piedmont Province and sediments of the Coastal Plain Province. The Piedmont Physiographic Province is subdivided into two sections: the Piedmont Uplands and the

Piedmont Lowlands. The Project is proposed in the Piedmont Lowlands section, within a region characterized as the Newark Basin containing Triassic-age sedimentary bedrock (shales and siltstone (Passaic formation), sandstone (Stockton formation) and argillite (Lockatong formation)), and Jurassic-age igneous intrusive (diabase dikes, and sills) and extrusive (basalt flows) rocks.

The bedrock geology in the immediate project area consists of late Triassic-age reddish-brown and grayish-red siltstone and shales of the Passaic formation. Surficial geology in the immediate Project area consists of Pleistocene-age glacial overburden deposits, including, from north to south along the alignment, the Plainfield Outwash, the Terminal Moraine, and the Metuchen Outwash. Glacial outwash deposits are characteristically comprised of coarse-grained deposits, consisting of sand to cobble-size material. During Scoping, the NJGWS commented that glacial outwash deposits within the Project area can be as much as 100 feet in thickness overlying bedrock (NJDEP 2020).

1.1 Mineral Resources

Texas Eastern conducted a review of the U.S. Mines Data Set which contains all mines under the jurisdiction of the U.S. Mine Safety and Health Administration (MSHA) and found that no active mines are within 0.25 mile of the proposed Project (MSHA 2019, NJDEP/ NJGWS 2006). The nearest mine to the Project (identified as the Valentine M.D.) is more than two miles east of the Project where it mines Coastal Plain sediments (Pennsauken sand and blue clay). Due to the distance of this mine, and its location within the Coastal Plain Physiographic Province, we conclude construction and operation of the Project would have no impact on its operations and, likewise, the mine would have no impact on the Project.

1.2 Paleontology

Fossil vertebrates and dinosaur footprints have been found in Triassic-age sedimentary bedrock (Passaic (Brunswick) formation) within the Newark Basin; however, no fossil vertebrates or dinosaur footprints have been found in the Triassic sediments of Middlesex County (NJDEP/NJGWS 1980). Due to the dense physical development and disturbance in the Project area, fossil remains in Pleistocene sediments are not anticipated. However, in the unlikely event that paleontological resources would be discovered during construction, Texas Eastern would notify the NJDEP-Geological and Water Survey to determine the appropriate course of action.

1.3 Geologic Hazards

Geologic hazards are natural physical conditions that can, when active, result in damage to land or structures, or injuries to people. Potential geologic hazards present in the Project areas include seismic hazards; landslides; karst terrain; and subsidence.

1.3.1 Seismic Hazards

Seismic hazards include earthquakes, surface faulting, and soil liquefaction. The USGS National Earthquake Hazard Reduction Program has developed a series of maps that depict the estimated probability that certain levels of ground shaking from an earthquake would occur within a given area over a period of time. To determine such estimates, the USGS takes into account the past seismic history of an area and the expected decrease in intensity with distance from the epicenter. These maps are used to create and update design provisions of building codes in the U.S. The codes provide design standards for buildings, bridges, highways, and utilities such as natural gas pipelines. Values on these seismic hazard maps are called peak ground acceleration (PGA) values and are expressed as a percentage of gravitational acceleration (acceleration of a falling object due to gravity), with a higher value indicating a greater potential hazard. The USGS seismic hazard maps show contour values that represent earthquake ground motion in terms of PGA, defined as percent gravity, which have an equal probability of being exceeded in 50 years.

The USGS seismic hazard mapping shows PGA (levels of horizontal shaking) for the Project area between 3- and 5-percent of gravity with a 10 percent chance of being exceeded in 50 years (475-year return period), and between 14- and 20-percent of gravity, with a two percent chance (2,500-year return period) of being exceeded in 50 years (USGS 2014a).

The modified Mercalli scale (Modified Mercalli Intensity or MMI) measures the intensity of an earthquake at a particular location while the Richter scale measures the size of the earthquake at its source. Slight damage is not typically experienced until an MMI of VI and considerable damage is not experienced until an MMI of IX (USGS 2013). An earthquake with a PGA of between 3 and 5 percent gravity would be approximately equivalent to an MMI of V, and with 14 percent gravity an equivalent MMI magnitude of VI depending on site conditions. An MMI of V is characterized by moderate ground shaking and very light damage, and an MMI of VI could be perceived as strong ground shaking but would only be expected to cause light damage (USGS 2011).

In general, modern electric arc welded steel pipelines have not sustained damage during seismic events except due to permanent ground deformation or traveling ground-wave propagation greater than or equal to an MMI of VIII (O'Rourke and Palmer 1994). However, the level of ground shaking is a factor in determining potential for permanent ground displacement hazards that can threaten a pipeline integrity, such as liquefaction, settlement, slope instability (particularly along steep sided slopes), lateral spread displacement, and dynamic compaction.

Soil liquefaction is a phenomenon in which a saturated cohesionless soil loses its shear strength when subjected to strong vibratory ground motion during an earthquake. All three conditions (fine-grained cohesionless, saturated soils such as along floodplains,

and strong ground motion (seismicity)) need to be present for soil liquefaction to occur. A combination of these three conditions is not present in the Project area, and the NJDEP-Geological and Water Survey has mapped the probability of occurrence for soil liquefaction within the Project area as a very low probability (NJDEP/NJGWS 1997).

Mapped faults identified from the USGS mineral resources integrated database (NJDEP 1999) exist at distances greater than three miles from the Project. However, these mapped faults do not show activity within the Quaternary Period (past 1,600,000 years) and are not considered as active faults. According to the USGS Quaternary Fault and Fold database of the United States, no Holocene-age faults exist in the vicinity of the Project area (USGS 2019a).

1.3.2 Landslides

Landslide is a general term describing downslope mass movement of soil, rock, or a combination of materials on an unstable slope. Movement can be rapid, moderate, or very slow and can involve large or small areas and volumes of material. Such gravity-induced flow is usually triggered by heavy rains, erosion by rivers, earthquakes, and by human activities such as land clearing and earth disturbance during construction.

NJDEP/NJGWS (1997) and USGS (1997) data were reviewed to determine landslide incidence and susceptibility in the Project area. The Project would be in an area designated as "low landslide incidence," meaning that less than 1.5 percent of the area is involved in landslides. Further, land slopes in the Project area range from 0 to 8 percent rendering landslides unlikely.

However, one area of steep slope (greater than 15 percent) is at the northern extent of the proposed Project within the Line 20 Tie-in facility. The slope increases to the south toward the freight railroad; however, this slope is avoided by directionally drilling beneath it with the Northern HDD. As such, there would be minimal chance of slope instability and subsequent landsliding during construction.

1.3.3 Subsidence and Karst Terrain

Land subsidence is the sinking of the Earth's surface, either gradually or suddenly, due to subsurface movement of materials such as water or soil. The Project is proposed in an area underlain by clastic sedimentary bedrock, and not an area of karst (carbonate) terrain, or in an area with groundwater pumping (aquifer mining) resulting in compaction of unconsolidated aquifers (the features/mechanisms which promote subsidence). As such, the Project would not be susceptible to subsidence events.

In conclusion we find that the Project would not affect mineral resources in the Project area or be affected during construction or operation of the proposed natural gas facilities by natural geologic hazards.

1.4 Geotechnical Investigation for HDD Construction

As discussed in section A.6.0, and summarized in table 3, about 81 percent of the 20-inch-diameter Line 20 Extension pipeline would be constructed utilizing HDD technology. Texas Eastern conducted nine geotechnical borings along the planned HDD alignment to characterize subsurface conditions, to collect sufficient geotechnical data in order to design the drill, and to assess the feasibility and risks, including an assessment of the potential for hydrofracturing and an inadvertent release/return (IR) of drilling fluids during drilling and construction of the Northern and Southern HDD extension pipeline segments. The results of this investigation were provided to the FERC in a *Final HDD Design Report* on March 6, 2020.[9]

The primary impact of HDD on the environment revolves around the use of drilling fluids. Drilling fluid is a slurry comprised predominantly of bentonite and water (typically 95 percent water), which may include drilling-fluid additives to manage site-specific geologic conditions. Bentonite clay (sodium montmorillonite) is a naturally occurring, hydrophilic clay that can absorb up to ten-times its weight in water. Bentonite is non-toxic to the aquatic environment and is a non-hazardous substance.

In reply to staff's environmental information request, Texas Eastern revised its BPP for HDD and committed to utilizing drilling fluid additives that are in compliance with NSF International/American National Standards Institute (NSF/ANSI) 60 certification, are acceptable by NJDEP permit conditions, and have documentation indicating that the additive is non-toxic to biotic receptors**.**

The principal functions of drilling fluid in HDD pipeline installation are:

- Hydraulic Excavation and Transportation of Spoil – Soil is excavated by erosion from high velocity fluid streams directed from jet nozzles on bits or reaming tools; and the drilled spoil, consisting of excavated soil or rock cuttings, is suspended in the fluid and carried to the surface by the fluid stream flowing in the annulus between the wall of the drilled hole and the drill pipe;

- Cooling and Cleaning of Cutters – High velocity fluid streams directed at the cutters remove drilled spoil build-up on bit or reamer cutters. The fluid also cools the cutters;

- Reduction of Friction – Friction between the drill pipe and the wall of the hole is reduced by the lubricating properties of the drilling fluid;

- Hole Stabilization – Drilling fluid stabilizes the drilled or reamed hole. This is critical in HDD pipeline installation as the drilled hole is often through loose soil formations and are uncased. Stabilization is

[9] Accession Number 20200306-5107.

accomplished by the drilling fluid building up a wall or mud cake which exerts a positive pressure on the hole wall. Ideally, the wall cake will seal pores and produce a bridging mechanism to hold soil particles in place;

- Transmission of Hydraulic Power – Power required to turn a bit and mechanically drill a hole is transmitted to a downhole motor by the drilling fluid; and

- Soil Modification – Mixing of the drilling fluid with the soil along the drilled path facilitates installation of a pipeline by reducing the shear strength of the soil to a near fluid condition. The resulting soil mixture can then be displaced as a pipeline is pulled into it.

Once discharged downhole, drilling fluid is uncontrolled and would flow in the path of least resistance. Ideally, the path of least resistance is through the annulus of the drilled hole and back to the fluid containment pits at the HDD endpoints. Depending on the degree of formation porosity and permeability, some of the drilling fluids are naturally dispersed into the surrounding soils.

Hydraulic fracture, also known as hydrofracture, is a phenomenon that occurs when drilling fluid pressure in the annular space of the drilled hole exceeds the shear strength of the soil surrounding the hole, resulting in plastic deformation and fracturing, which allows drilling fluid to escape into the formation along these developed fractures and possibly up to the ground surface. Drilling fluid that makes its way to the ground surface is known as an IR of drilling fluids. Drilling fluids that discharge to the surface could be problematic if discharged into an environmentally sensitive resource, such as a stream or wetland, or within an urban environment or a recreational area. Although the possibility of lost circulation and IRs cannot be eliminated, drilling fluids and drill parameters may be adjusted to maximize drilling fluid circulation and minimize the risk of IRs.

Texas Eastern assessed the risk of hydrofracture for both the Northern and Southern HDDs by comparing the confining capacity of the subsurface, known as the *formation limit pressure*, to the annular pressure necessary to conduct HDD operations. If this analysis shows that the drilling fluid pressure in the annulus exceeds the confining capacity of the overlying soils, there is a risk that an IR of drilling fluids could occur as a result of hydrofracture. The formation limit pressures for the proposed HDD crossings on the Middlesex Extension Pipeline Project were calculated using the U.S. Army Corp of Engineers Delft Method (U.S. Army Corp of Engineers 1998).

The Delft Method is widely accepted for estimating the potential for hydrofracture on HDD installations through unconsolidated sediments; however, the method was not specifically developed for crossings installed through consolidated bedrock, which this Project would be. A widely recognized method for calculating confining pressure of HDD operations through bedrock has not yet been adopted in the HDD industry. It is

more likely that inadvertent drilling fluid returns, should they occur, would result from flow through existing joints or fractures in the rock. As such, a qualitative assessment of rock quality designation (RQD)[10] along the HDD profile is a more useful parameter when considering drilling fluid losses in consolidated bedrock, and IRs during drilling. RQD is a rough measure of the degree of jointing or fracturing in a rock mass and can be an indicator of the potential for drilling fluid losses during drilling.

In addition to the qualitative RQD evaluation, Texas Eastern conducted a quantitative analysis of the risk of hydrofracture during HDD installations on the Middlesex Extension Project, which would involve passing through consolidated sedimentary bedrock along each of the drill profiles. In this analysis, Texas Eastern used a conservative assumption that the bedrock (siltstone) would behave similarly to dense, fine sand when subjected to annular pressure. In evaluating the formation limiting pressure, geotechnical parameters of subsurface materials were chosen based on geologic characterization and classification of subsurface material provided in the geotechnical report prepared for Texas Eastern by Mueser Rutledge Consulting Engineers for each of the HDD profiles.[11]

In addition to IRs, post-installation ground settlement along an HDD alignment could occur as the reamed hole progressively degrades and breaks down over time, filling the annulus surrounding the installed pipeline with soil. Volume loss from the overlying soil could propagate to ground surface in the form of a broad trough-shaped depression, which could damage roadways, utilities, and other structures. The risk of post-installation settlement is generally greatest in areas where the HDD segment is shallow, typically near the entry and exit points, and where the subsurface consists of loose granular soil with little arching capability. A crossing feasibility assessment for each crossing, based on the results of the geotechnical investigations conducted is discussed below.

1.4.1 Geologic Conditions along the Southern HDD

Geologic mapping of the Southern HDD alignment shows that the surficial glacial material is comprised of glacial till of the terminal moraine deposits, extending south to around Woodbridge Avenue, with the remainder of the surficial deposits consisting of glacial outwash deposits extending to the south. Both of these glacial deposits contain mixtures of sand, gravel, and cobbles. The underlying Passaic Formation throughout this

[10] RQD is defined as a modified core recovery percentage in which all the pieces of sound core over 100 mm (4 in.) long are summed and divided by the length or the core. The RQD index is an index or rock quality in that problematic rock that is highly weathered, soft, fractured, sheared, and jointed is counted against the rock mass. Thus, it is simply a measurement of the percentage of "good" rock recovered from an interval of a borehole. Deere, D. U. and Deere, D. W., "The Rock Quality Designation (RQD) Index in Practice," *Rock Classijicatio11 Systems for E11gi11eeri11g Purposes, ASTM STP 984,* Louis Kirkaldie, Ed., American Society for Testing and Materials, Philadelphia, 1988, pp. 91-101.

[11] Mueser Rutledge Consulting Engineers titled "Geotechnical Data Report, Enbridge Middlesex Project, Edison, New Jersey" dated February 7, 2020, and Addendum 1 to the geotechnical report dated February 21, 2020.

drill is described as fine to coarse grained sandstone, siltstone, or shale, separated by gray or black siltstone, mudstone, shale and silty argillite (Herman 2001).

Four site-specific exploratory borings (C-1 through C-4) were taken along or immediately adjacent to the proposed Southern HDD alignment to confirm geologic mapping and provide data to further characterize the subsurface. Boring C-1 was taken near the proposed HDD entry point on the south end of the crossing to a depth of 135 feet bgs; boring C-2 was taken along the alignment near the mid-point of the crossing at the intersection of John Street and Woodbridge Avenue to 150 feet bgs; boring C-3 was taken 100 feet east of the alignment just south of Ped Place, approximately 260 feet south of the exit point to a depth of 150 feet bgs; and boring C-4 was taken on the east side of the powerline easement approximately 400 feet north of the proposed HDD exit point and was drilled to a depth of 165 feet.

The borings encountered outwash deposits overlying siltstone of the Passaic Formation. RQD averaged about 74, indicating good quality rock along the proposed HDD design profile. Depth to groundwater monitored in the borings ranged from 17 feet to 37 feet, bgs one to two days following drillings. A brief description of the subsurface conditions encountered in each boring is provided in table 5.

Table 5. Summary of Subsurface Conditions along Southern HDD Profile

Boring Number	Depth (feet below ground surface)	Description of Subsurface Material
C-1	0 – 2;	Fill: Sand, silt, and gravel.
	2 – 19;	Gravelly Sand/Till: Gravelly fine to coarse sand.
	19 – 29;	Outwash Sand: Fine to coarse sand, some silt.
	29 – 42;	Residual Soil: Clayey silt.
	42 – 61; and	Decomposed Rock: Very compact clayey fine sand to coarse sand. Some rock fragments.
	61 – 135.	Siltstone: Moderately hard to moderately weathered siltstone.
C-2	0 – 2;	Fill: Sand, silt, and gravel.
	2 – 15;	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt, gravel and cobbles.

Table 5. Summary of Subsurface Conditions along Southern HDD Profile		
Boring Number	**Depth (feet below ground surface)**	**Description of Subsurface Material**
	15 – 32; 32 – 39; 39 – 51; and 51 -150.	Outwash Sand: Fine to coarse sand, some silt, trace clay, gravel. Residual Soil: Silty clay. Decomposed Rock: Very compact fine sand to coarse sand. Some rock fragments. Siltstone: Moderately hard to moderately weathered siltstone.
C-3	0 – 2; 2 – 14; 14 – 24; 24 – 35; 35 – 41; and 41 – 150.	Fill: Sand, silt, and gravel. Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt, gravel and cobbles. Outwash Sand: Clayey fine to coarse sand. Residual Soil: Silty clay and clayey silt. Decomposed Rock: Fine sand to coarse sand. Some rock fragments. Siltstone: Moderately hard to moderately weathered siltstone.
C-4	0 – 36; 36 – 54; 54 – 62; and 62 - 165	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt. Residual Soil: Silty clay and clayey silt. Decomposed Rock: Fine sand to coarse sand. Some rock fragments. Siltstone: Moderately hard to moderately weathered siltstone.

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method, and were based on the pilot hole being advanced from south (entry) to north (exit). The analysis shows that during drilling of the pilot hole and under normal drilling operations with full drilling fluid returns to the entry point, the annular

pressure would remain below the formation limit pressure with a factor of safety of 2.0[12] or greater over most of the crossing's length, indicating a low risk of inadvertent drilling fluid returns due to hydrofracture, with the exception of the last 115 feet of the crossing near the exit point, where ground cover is reduced as the drill bit approaches the surface. At this location, the risk of a drilling fluid release due to hydrofracture is elevated.

The potential for an IR was also evaluated using bedrock RQDs calculated during bedrock coring. For the Southern HDD, RQD values indicate good quality bedrock overall, and with a relative design depth of the crossing of between 80 and 90 feet bgs, the risk of drilling fluid making its way to the ground surface over much of the crossing is low.

Likewise, the risk of surface settlement and drilling fluid induced heaving is low over much of the crossing because the Southern HDD would be installed through consolidated sedimentary bedrock with about 90 feet of cover beneath U.S. Route 1 and over 80 feet of cover over much of the rest of the crossing (see appendix B). It is only near the entry and exit points where the crossing is passing through overburden soils at relative shallow depths that heaving or settlement may be a risk.

In conclusion, based on the site-specific geotechnical borings, the Southern HDD profile would be installed through good quality sedimentary bedrock over the majority of its length. Although the overburden material above bedrock consists of glacial till which may contain gravel and cobbles, and which could be problematic near the drill's entry and exit points, the till is generally limited to a depth of approximately 30 feet. Should it be necessary, Texas Eastern would install large-diameter surface casing through these near-surface materials to prevent collapse and to control drilling fluid release near the entry and exit points.

1.4.2 Geologic Conditions along the Northern HDD

Geologic mapping of the Northern HDD alignment shows that the area is characterized by glacial deposits and artificial fill overlying sedimentary bedrock of the Passaic Formation. The glacial material associated with the Northern HDD is mapped as till of terminal moraine containing mixtures of sand, gravel, and cobbles. The Passaic Formation is described as fine to coarse grained sandstone, siltstone, or shale, separated by gray or black siltstone, mudstone, shale and silty argillite.

Five site-specific exploratory borings (C-5, C-5N, C-6, C-6N, and C-7W) were taken in the vicinity of the proposed Northern HDD alignment to confirm geologic mapping and further characterize the subsurface. In addition, boring C-4 (drilled to a depth of 165 bgs) on the east side of the powerline corridor approximately 200 feet south

[12] The point at which the estimated annular pressure exceeds the formation limit pressure (factor of safety = 1.0) is the theoretical point at which plastic yielding and cracking in the formation reaches the ground surface, indicating a high risk of an inadvertent drilling fluid return.

of the proposed exit point for the Northern HDD was utilized in the analysis of the Northern HDD.

Boring C-5 was taken within the powerline corridor, approximately 800 feet north of the exit point and drilled to 160 feet bgs; Boring C-5N was taken on the west side of the powerline corridor at the approximate midpoint of the HDD installation and drilled to 145 feet bgs; Boring C-6 was taken on the east side of the proposed alignment just south of the multi-track railroad and drilled to a depth of 140 feet bgs; Boring C-6N was taken near the proposed entry point and drilled to a depth of 165 feet; and Boring C-7W was taken approximately 950 feet south of the entry point on the east side of the powerline corridor to a depth of 145 feet bgs. Depth to groundwater monitored in the borings ranged from 23 feet to 37 feet, bgs one to two days following drillings.

The exploratory borings encountered a variable stratigraphy associated with terminal moraine deposits overlying siltstone and shale bedrock. The borings also indicated the presence of a buried bedrock valley with the top of bedrock sloping downward from elevation 42 at Boring C-4, to an elevation of -2 near Boring C-6, and then sloping upward to elevation 40 at Boring C6N (see Northern HDD profile in Appendix B). RQD values from bedrock cores averaged 33 for Borings C-6N and C-7W; and 63 for Borings C-5, C-5N. This indicates poor quality rock along the approximate one-third of the crossing to the north and fair quality rock along the final two-thirds of the crossing to the south. A description of the subsurface materials encountered in each boring is provided in table 6.

Table 6. Summary of Subsurface Conditions along Northern HDD Profile

Boring Number	Depth (feet below ground surface)	Description of Subsurface Material
C-5	0 - 56	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt. Frequent rig chatter from 43' to 50' was observed in this stratum indicative of the presence of coarse gravel or cobbles. Boulders may also be present.
	56 – 61	Interlayered Glacial Deposits: Silty clay, clayey silt, fine sand.
	61 - 70	Clean Sand: Fine to coarse sand.
	70 -76	Decomposed Rock: Very compact fine sand to coarse sand. Some rock Fragments.
	76 - 160	Siltstone: Moderately hard to moderately weathered siltstone.

Table 6. Summary of Subsurface Conditions along Northern HDD Profile		
Boring Number	**Depth (feet below ground surface)**	**Description of Subsurface Material**
C-5N	0 - 19	Gravelly Sand/Till: Gravelly fine to coarse sand, clayey fine to coarse sand.
	19 - 31	Interlayered Glacial Deposits: Silty fine to medium sand and silty clay.
	31 - 64	Clean Sand: Fine to coarse sand, some silt.
	64 – 88	Interlayered Glacial Deposits: Silty fine to medium sand and silty clay, clayey silt.
	88 – 91	Decomposed Rock: Very compact fine sand to coarse sand. Some rock Fragments.
	91 - 145	Siltstone: Moderately hard to moderately weathered siltstone.
C-6	0 - 14	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt.
	14 - 29	Interlayered Glacial Deposits: Fine to coarse sand, silty clay, some gravel.
	29 - 76	Gravelly Sand/Till: Fine to coarse sand, some silt, some gravel.
	76 - 90	Interlayered Glacial Deposits: Clayey silt.
	90 – 102	Clean Sand: Fine to coarse sand, trace silt, some gravel.
	102 - 140	Siltstone: Moderately hard to moderately weathered siltstone.
C-6N	0 - 34	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt. Frequent rig chatter from 22’ to 29’ was observed in this stratum indicative of the presence of coarse gravel or cobbles. Boulders may also be present.
	34 - 42	Interlayered Glacial Deposits: Silty clay, clayey silt, fine sand.

Table 6. Summary of Subsurface Conditions along Northern HDD Profile		
Boring Number	**Depth (feet below ground surface)**	**Description of Subsurface Material**
	42 - 82	Decomposed Rock: Very compact fine sand to coarse sand. Some rock Fragments.
	82 - 165	Siltstone: Unweathered to highly weathered shale.
C-7W	0 - 89	Gravelly Sand/Till: Clayey fine to coarse sand, gravel, some silt. Frequent rig chatter from 20' to 80' was observed in this stratum indicative of the presence of coarse gravel or cobbles. Boulders may also be present.
	89 - 94	Interlayered Glacial Deposits: Silty clay.
	94 - 101	Decomposed Rock: Rock fragments. Some coarse sand.
	101 - 145	Siltstone: Unweathered to highly weathered siltstone.

A quantitative assessment of the risk of hydrofracture for the Northern HDD was also conducted using the Delft Method and were based on the pilot hole for the HDD profile being advanced from north to south. The analysis showed that pilot hole drilling under normal drilling operations, and with full drilling fluid returns to the entry point, the annular pressure would remain below the formation limiting pressure with a factor of safety of 2.0 indicating a low risk of inadvertent drilling fluid returns due to hydrofracture. This condition holds for the majority of the crossing with the exception of the last 125 feet of the drill profile near the exit point, where ground cover is reduced as the drill bit approaches ground surface.

As discussed above, RQD values indicate that the bedrock (siltstone) is of poor quality on the north end of the crossing; and as such, fractures present could increase the risk of drilling fluid circulation loss into the formation. However, because the overburden materials above bedrock consists of medium dense to dense glacial deposits of sand with some silt, clay, and gravel (see table 6), these overburden materials could serve as a barrier to upward drilling fluid flow to the ground surface. Although the occurrence of an inadvertent drilling fluid return cannot be ruled out, we view the risk as low overall, with the exception of the shallow segments of the crossing near the entry and exit points.

The risk of inadvertent drilling fluid returns surfacing along or adjacent to the alignment, including the freight and passenger railway, and damage to Oakwood Avenue due to drilling fluid induced heaving or settlement resulting from ground instability is likewise considered low given the overall design depth and subsurface conditions. In the case of the Northern HDD, the risk of drilling fluid impact has been reduced by designing the HDD crossing profile through sedimentary rock at a depth of about 90 feet beneath the freight and passenger railway, and 120 feet beneath Oakwood Avenue (see appendix B).

1.4.3 Project Best Practices for Horizontal Directional Drilling

Texas Eastern's BPP for HDD addresses the remedial actions if an IR were to occur at ground surface, within environmental resources (wetland or waterbody), or, given the density of nearby residences, within residential properties and building basements. Texas Eastern prepared its BPP for HDD using our *HDD Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plan*.[13] Components of the BPP for HDD include personnel training and responsibilities; work processes and procedures; stakeholder notification procedures; monitoring and reporting procedures; response procedures for an IR of drilling fluid; and contingency plans if the HDD is determined to be unsuccessful.

Based on our review of site-specific data and analysis for both the Northern and Southern HDDs, we find that the proposed HDDs would be feasible with a minimal chance for an IR at ground surface. Additionally, we find Texas Eastern's BPP for HDD acceptable.

2.0 SOILS

Soils within the Project area were identified and assessed using the SSURGO database (Natural Resources Conservation Service [NRCS] 2019a). General information regarding the soil series and map units was obtained from official soil series descriptions available online (NRCS 2019b) or contained within the U.S. Department of Agriculture's (USDA) NRCS Soil Surveys of Middlesex County (NRCS 1987) or Union County (NRCS 2002), New Jersey.

2.1 Soil Unit Descriptions for the Pipeline and Aboveground Facilities

Four soil units are mapped within the proposed locations of Project pipeline and aboveground natural gas facilities. These mapped soil units include the:

1. Boonton loam (3 to 8 percent slope);
2. Boonton-Urban land complex (0 to 8 percent slope);

[13] FERC's Final HDD Guidance (October 2019) can be accessed at https://www.ferc.gov/industries/gas/enviro/guidelines/hdd-final.asp

3. Dunellen-Urban land complex (0 to 3 percent slope); and
4. Lansdowne silt loam (0 to 2 percent slope.

A summary of soils that would be disturbed during construction of the Project pipeline and aboveground facilities, and their characteristics are provided in table 7.

2.2 Potential Impacts on Soils During Construction

Texas Eastern evaluated the soils within the proposed Project area to identify soil characteristics that could impact construction or increase the potential for construction-related soil impacts. The soil characteristics evaluated were:

- loss of soil due to water or wind erosion;
- reduction of soil quality by mixing topsoil with subsoil;
- hydric soils;
- soil compaction due to equipment traffic; and
- disruption of surface and subsurface stormwater infiltration.

In addition, the presence of certain soil conditions (e.g., slope, low fertility, etc.) could result in poor revegetation.

Water and wind are forces that have the potential to cause soil erosion, and bare soils that are exposed and are not stabilized by vegetation or an artificial cover have a greater potential for erosion. Erosion potential for each soil type within the Project area was assessed using the SSURGO database is are summarized in table 7.

Water Erosion

Soil erosion potential caused by water was determined by each soil type's K factor (erodibility index). The K factor is a quantitative analysis of a particular soil type that measures the susceptibility of soil particles to detach and transport by rainfall and runoff.[14] Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water (NRCS 2019a). One soil did not have a K factor rating: Boonton loam, 3-8 percent slopes; and three soils were within the moderate potential for erosion by water: Boonton-Urban land complex, 0-8 percent slopes; Dunellen-Urban Land Complex, 0 to 3 percent slopes; and Lansdowne silt loam, 0 to 2 percent slopes.

[14] A K factor range of 0.02 to 0.23 signifies low potential for erosion by water; a K factor range of 0.23- 0.43 signifies moderate potential for erosion by water; and a K factor range of 0.43-0.69 signifies high potential for erosion by water.

Table 7. Summary of Soil Characteristics Along Planned Pipeline Alignment and Aboveground Facilities

Map Unit Name and Symbol	MPs[b]	Construction Impacts (Acres)[c]	USDA Farmland Designation	Hydric Soils	Drainage Class[c]	Compaction Potential[e]	Erosion Potential		Depth to Water Table[h] (Inches)	Depth to Bedrock[i] (inches)	Infiltration Potential[j]
							Water (K)[f]	Wind (WEG)[g]			
Boonton loam, 3-8 percent slopes	0.08 – 0.11 0.26 – 0.40	0.76	Prime	Non-Hydric	WD	Medium	No Rating	5	>79	>79	Somewhat Limited
Boonton-Urban land complex, 0-8 percent slopes	0.0 – 0.08 0.11 – 0.26 0.40 – 0.98 1.04 – 1.47	14.23	Not Prime	Non-Hydric	WD	Medium	0.32	5	>79	>79	Somewhat Limited
Dunellen-Urban Land Complex, 0 to 3 percent slopes	1.47 – 1.55	0.21	Not Prime	Non-Hydric	WD	Medium	0.28	5	>79	>79	Somewhat Limited
Lansdowne silt loam, 0 to 2 percent slopes	0.98 – 1.04	0.95	Statewide Importance	Inclusions	SPD	Medium	0.32	5	21	60	Severely Limited

Source: NRCS, 2019a
NR = Not Rated in the SSURGO database N/A = Not Applicable
MP = Milepost

a. Water is mapped but field observations indicate no water is present within the workspace and has not been included. The surrounding soil map unit was assumed.
b. Start and End MPs for each soil unit crossed. DuuA soil type present at Transco M&R and Tie-in piping south of MP 1.55.
c. Construction impacts are calculated where earth disturbance is proposed. HDD areas where only monitoring would occur are not included.
d. Drainage Classes: VPD – very poorly drained, PD – poorly drained, SPD – somewhat poorly drained, MWD – moderately well-drained, WD – well-drained.
e. Compaction Potential: Low - The potential for compaction is insignificant. This soil is able to support standard equipment with minimal compaction. The soil is moisture insensitive, exhibiting only small changes in density with changing moisture content. Medium - The potential for compaction is moderate. The growth rate of seedlings may be reduced following compaction. After the initial compaction (i.e., the first equipment pass), this soil is able to support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive. High - The potential for compaction is significant. The growth rate of seedlings would be reduced following compaction. After initial compaction, this soil is still able to support standard equipment, but would continue to compact with each subsequent pass. The soil is moisture sensitive, exhibiting large changes in density with changing moisture content.
f. Erosion factor K Factor indicates the susceptibility of a soil to sheet and rill erosion by water. K Factor is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.
g. WEG = Wind Erodibility Group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.
h. "Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table. This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.
i. A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restricts roots or otherwise provides an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. Lithic Bedrock is the restrictive layer represented. If no restrictive layer is described in a map unit, it is represented by the ">200" centimeters (79 inches) depth class.
j. Soil Infiltration ratings are based on the soil properties that affect infiltration. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified infiltration system. "Not limited" indicates that the soil has features that are very favorable. "Somewhat limited" indicates that the soil has features that are moderately favorable. "Severely limited" indicates that the soil has one or more features that are unfavorable.

Wind Erosion

The soil erosion potential caused by wind transport was determined by each soil type's Wind Erodibility Group (WEG). The WEGs are primarily based upon soil texture, organic matter content, and rock fragments content. The WEG values range from one through eight, with the soil type least susceptible to wind erosion being eight. Soil units within the Project area are designated as moderate wind erosion potential (NRCS 2019a).

Hydric Soils

Hydric soils are soils that are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (U.S. Army Corps of Engineers 1987). Generally, hydric soils are those that are poorly drained or very poorly drained. No soils within the Project area have been exclusively designated as hydric; however, one soil has the potential to form hydric inclusions within the soil unit: Lansdowne silt loam, 0 to 2 percent slopes.

Soil Compaction

The USDA-NRCS-SSURGO database defines compaction potential as "Low" where the potential for compaction is insignificant; "Medium" where the potential for compaction is moderate; and "High" where the potential for compaction is significant (NRCS 2019a). All soil units within the Project area have a compaction rating of Medium though one soil unit (Lansdowne silt loam, 0 to 2 percent slopes) in the proposed construction right-of-way in the middle of the Project has the potential to form hydric soil inclusions and these areas may have a High compaction rating.

Stony/Rocky Soils

Introducing stones or rocks to surface layers may reduce the capacity of the soil to retain moisture, resulting in a reduction of soil productivity. Areas with shallow depth to bedrock (less than 60 inches) are identified as areas that have potential to introduce rock to topsoil. Depth to bedrock is identified as greater than 79 inches in all soils types within the Project area, with the exception of Lansdowne silt loam, 0 to 2 percent slopes, which shows a designated depth to bedrock at 60 inches.

Prime Farmland and Farmland of Statewide Importance

The pipeline and above ground facilities are proposed predominately within existing utility rights-of-way where there are no current agricultural activities and the proposed contractor ware yards are at existing Texas Eastern facilities. No impacts on Prime Farmland or Farmland of Statewide Importance are anticipated. One soil unit is mapped as Farmland of Statewide Importance: Lansdowne silt loam, 0 to 2 percent slopes. This soil type is within the construction right-of-way in the middle of the Project and would be used to support the HDDs and conventional lay in this area. This

area currently functions as a utility right-of-way that is routinely mowed creating an herbaceous cover type. No agricultural activities occur in the area. Additionally, this area would be returned to its previous use after construction.

2.3 Mitigation of Soil Impacts during Project Construction and Operation

Clearing and grading activities for Project construction would remove surface vegetation from some Project locations, although the Project's use of HDD minimizes the need for vegetation removal. All areas exposed to water and wind erosion due to the removal of vegetation (or other stabilizing cover type such as gravel or pavement) would be managed in accordance with Texas Eastern's soil erosion and sediment control best management practices (BMP) procedures as outlined in its E&SCP. Texas Eastern's E&SCP incorporates our *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and our *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures). Texas Eastern states its E&SCP would serve as the basis for developing a Project-specific E&SCP, in accordance with the Freehold Soil Conservation District (FSCD) specifications and the NJDEP's Stormwater BMP Manual (NJDEP 2018), and that the Project-specific E&SCP would be provided to the FSCD for review and certification prior to construction.

Upon completion of construction, Texas Eastern would stabilize all disturbed areas in accordance with the specifications in the E&SCP, facility site plans, and applicable landowner agreements.

Hydric soils were identified in the wetlands at the southern extent of the Project and would be avoided during construction and operation of the proposed Project. Wetlands are discussed further in section B.3.4.

If construction activities, particularly the operation of heavy equipment, occur when soils are saturated, soil compaction and rutting could occur. Texas Eastern would minimize compaction by implementing BMPs as specified within the Project-specific E&SCP. Equipment mats and/or gravel would be used as needed to minimize rutting and compaction of saturated soils. Grading to restore natural site contours and repair rutted areas would be completed prior to final seeding and mulching, which would initiate natural restoration of soil structure and bulk density.

Successful revegetation of disturbed areas is important for establishing long-term erosion control and preventing sedimentation to sensitive resources. Soil fertility and density are generally the two main factors that may limit successful vegetative growth. To minimize poor vegetative growth, Texas Eastern would perform decompaction of subsoil then spread segregated topsoil over the subsoil. Topsoil would be tested to determine its fertility potential and amended with fertilizers for seedbed preparation. Texas Eastern would place soil amendment specifications into the Project-specific

E&SCP, and seed type and spreading rate would be established by the *Standards for Erosion and Sediment Control in New Jersey* and requirements of the FSCD.

Though residential land use is impacted by the proposed Project (see section B.5.0), there are no properties impacted within the construction right-of-way at the middle or southern extent that are owned by residential landowners. The utility right-of-way in these areas is maintained by the utility operators as lawn, and many abutting landowners use this space as an extension of their property. In these areas, Texas Eastern would follow the utility right-of-way landowner specifications for restoration which entails returning the disturbed areas to lawn. In the construction right-of-way at the northern Project extent, minimal areas surrounding parking spaces and garages is maintained as lawn. Texas Eastern states that this disturbed area would be restored to pre-construction conditions.

With these measures, we conclude that construction impacts on soils would be temporary, minimized to the extent practicable with Texas Eastern's Project-specific E&SCP and construction and restoration best practices, and would not be significant.

2.4 Contaminated Soils

One area within the Project boundary was determined to have soil contamination which is related to the former railroad that has been converted to the Middlesex Greenway rails-to-trail park (Greenway). Texas Eastern performed a file review in May 2019 at the NJDEP offices to obtain information on the contaminated soil present at the Greenway and found that Middlesex County (the owner of the Greenway) developed a Remedial Action Report that details engineering controls put in place within its Deed Notice Restricted Area to protect the public from contaminated soil during use of the trail. The engineered remedial controls over the former railroad tracks consist of geotextile fabric, gravel, and pavement that forms the surface of the recreational trail, and acts as a cap. The remedial control does not extend into the Project area as it ends at an elevated portion of the Greenway that spans over and across U.S. Route 1.

Texas Eastern conducted further investigations and coordinated with the Licensed Site Remediation Professional (LSRP) employed by Middlesex County who manages the Greenway Remedial Action Plan. The LSRP confirmed that that the area beneath the elevated section of the Greenway is outside of the Deed Notice Restricted Area and that there are no engineering remedial controls in place within the temporary workspace crossing beneath the Middlesex Greenway. The Middlesex Greenway Remedial Action Report did identify contaminated soil within this area. Historic aerial photography show that significant earth disturbance took place during construction of U.S. Route 1 and the elevated section of the Greenway in 2007. Records of contaminated soil cleanup and removal have not been identified; therefore, Texas Eastern would assume that this area may contain contaminated soil.

Additionally, historic fill was mapped by the NJDEP along the passenger railroad corridor at the northern extent of the Project and along U.S. Route 1 in the southern extent of the Project.

Prior to pipeline installation Texas Eastern has committed to collecting soil samples from these areas for laboratory analysis. The results of this soil sampling would be filed with the FERC along with anticipated soil management methods. Texas Eastern States that the soil sampling and analysis program would be conducted in accordance with the NJDEP's Technical Requirements for Site Remediation.[15] Soil samples would be visually and olfactory screened as well as with a photoionization detector to identify the presence of volatile organic compounds (VOCs) to a depth of 12 feet, the anticipated depth of conventional trenching. Samples collected for VOC analysis would not be composited. However, depth-composited soil samples would be collected for the management and disposal of contaminated soils in accordance with the NJDEP Site Remediation Program – 2010 Linear Construction Technical Guidance, and applicable regulations.[16]

In the event that of an unanticipated discovery of contaminated soil during construction, Texas Eastern would implement its *Spill Prevention Control and Countermeasure* (SPCC) *Plan* and *Preparedness, Prevention, and Contingency* (PPC) *Plan for Construction Projects,* and would adhere to applicable regulations regarding disposal. Texas Eastern's SPCC Plan outlines the steps to be followed in the event that contaminated sediments or soils, as identified by evidence of subsoil discoloration, odor, sheen, or other visual or olfactory indicators, are encountered during construction. The Project SPCC and PPC Plans would be implemented as needed upon an unanticipated discovery of contaminated soils.

Lastly, during construction, contamination from accidental spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely impact soils. Texas Eastern and its contractors would follow its SPCC and PPC Plans to prevent and manage spills, if they occur. The SPCC and PPC Plans detail pre-planning procedures to minimize potential for spills and leaks, as well as cleanup procedures in the event of soil contamination from spills or leaks, and who should be notified in the event of a spill. We have reviewed these plans and find them acceptable for an unanticipated discovery of contaminated soils, and to mitigate for any accidental spills or leaks that may occur during Project construction. Given the measures that Texas Eastern would implement, we conclude that any impacts from contamination would not be significant.

[15] NJDEP 2018. Technical Requirements for Site Remediation N.J.A.C 7:26E.
[16] NJDEP 2012. Site Remediation Program. Linear Construction Technical Guidance.

3.0 WATER RESOURCES

3.1 Groundwater

Groundwater storage within the Newark Group of sedimentary bedrock aquifers occurs in primary and secondary porosity in the Stockton sandstone formation, and within secondary porosity and permeability in bedrock joint and fracture systems in the Lockatong and Passaic formations within the upper 200 to 300 feet of bedrock. The Passaic Formation is a principal aquifer in central New Jersey. Locally, within the Project area, the sedimentary shale and siltstone bedrock overlying the Lockatong formation is designated as the Brunswick Aquifer (NJDEP 2001). Well yields from the Brunswick aquifer in New Jersey have a median well yield of between 100 and 250 gallons per minute (Herman 1998).

As discussed in section B.1.0, surficial deposits within the immediate Project area consist of Pleistocene-age glacial overburden comprised of glacial till and outwash overlying bedrock, and as discussed in section B.1.4.2 the borings indicated the presence of a buried bedrock valley with the top of bedrock sloping downward from elevation 42 at Boring C-4, to an elevation of -2 near Boring C-6, and then sloping upward to elevation 40 at Boring C6N (see Northern HDD profile in appendix B). Where these materials attain a thickness of at least 50 feet, they could comprise surficial aquifers with the capability of producing sufficient quantity (average 250 to 500 gallons per minute from stratified drift deposits) and quality of water to wells in the Project area (French 1996), and as discussed the surficial materials in the project area could be as much as 100 feet (NJDEP 2020).

3.1.1 Sole-Source Aquifers

A sole-source aquifer is defined by the EPA as an aquifer which contributes 50-percent of more of drinking water to a specific area and are defined with guidelines in section 1424(e) of the Safe Drinking Water act of 1974. The EPA designated seven sole-source aquifers (SSAs) in New Jersey based on a combination of an aquifer's recharge zone and its upstream source area (stream-source zone) that contributes to a recharge area.

Most of New Jersey's counties are covered by at least one of the seven SSAs, and the Project is proposed within an area that is immediately surrounded to the north, west and east/southeast by three of these SSAs (Buried Valley, Northwest New Jersey, and Coastal Plain SSAs). However, the aquifers beneath the Project, including the temporary off-site contractor ware yards have not been designated as constituting an SSA.

3.1.2 Public and Private Wells, and Well Head Protection Areas

A Well Head Protection Area (WHPA) in New Jersey is defined as both an area modeled around an unconfined Public Community Water Supply well that delineates the

horizontal extent of groundwater captured by a well pumping at a specific pumping rate over two-, five-, and twelve-year periods of time for unconfined wells; and a 50-foot radius delineated around each confined Public Community Water Supply well**.** A WHPA for a Public Non-Community Water Supply Well in New Jersey is a map area calculated around a Public Non-Community Water Supply well that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period.[17]

No public community or non-community WHPAs were identified within or near the Project area, including the off-site contractor ware yards in Union County (NJDEP 2019a). The nearest WHPA to the Project is approximately 0.5 mile to the north.

One domestic well was identified within 150 feet of the Project (NJDEP 2019b and EDR 2019). Well coordinates place the well adjacent to the construction right-of-way at the southern Project extent. Texas Eastern has committed to not storing or refueling equipment within 150 feet of any water wells and springs. However, Texas Eastern states that it's attempts to locate this well were unsuccessful.

A well search conducted for the off-site contractor ware yards in Union County did not find identify any wells within 150 feet of the yards.

3.1.3 Existing Groundwater Contamination

Based on review of an Environmental Data Resources, Inc. (EDR) report, NJDEP online databases DataMiner and GeoWeb, and/or NJDEP Site Remediation Program (SRP) Records, and as discussed in section B.5.1, six sites were identified within 0.25 mile of the Project area with known groundwater contamination; These sites include, as shown on figure 2:

- Site 1: Lamp Cleaners located in the central portion of the commercial strip shopping center building south of the intersection of Route 27 (Woodbridge Avenue) and Parsonage Road, approximately 500 feet northeast of the northern extent of the Project area;
- Site 2: Hess Station #30205 (Hess) located in the shopping center complex south of the intersection of Route 27 and Parsonage Road, approximately 470 feet northeast of the Northern Project extent;
- Site 3: Shell Service Station/M&R Shell (Shell) located approximately 600 feet northeast of the northern extent of the Project area at 33 Route 27 (east of the intersection of Route 27 & Parsonage Road);

[17] https://njogis-newjersey.opendata.arcgis.com/datasets/d9fead9109f84c71997e07dba8502bea_25

- Site 4: Delta Service Station (Delta) located approximately 825 feet east of the southern extent of the Project area at 1065 Amboy Avenue in Edison;

- Site 5: B&W Automotive (B&W) located approximately 1,230 feet west of the southern extent of the Project area at 21 Amboy Avenue in Metuchen; and

- Site 6: Roosevelt County Park (RCP) approximately 750 feet east of the central Project area on the north side of Oakwood Avenue between Koster Boulevard and Roosevelt Drive in Edison.

Texas Eastern states a remedial investigation (RI) was conducted at the Lamp Cleaners site consisting of the installation and sampling of temporary monitoring wells (TMWs) as a result of chlorinated volatile organic compounds (CVOC) detected in nearby monitoring wells associated with the Hess Station #30205 (Site 2). Based on the RI results and a review of monitoring well data for the Hess site contained in NJDEP SRP files, CVOC groundwater impacts from the Lamp Cleaners site are intermingled with gasoline impacts identified by Hess. While no groundwater modeling of the CVOC groundwater contamination has been completed for the Lamp Cleaners site, no CVOCs have been detected in Hess's sentinel monitoring wells located nearest to the Project area (approximately 155 feet east of the Project area). Based on a review of the RI activities performed at the Lamp Cleaners site and the Hess site below, CVOC impacts appear to be primarily in the area of the Lamp Cleaner tenant space.

The Hess station, which has been replaced by a 7-Eleven convenience store, has a Classification Exception Area that was established in 2002 for benzene, toluene, ethylbenzene, xylene (BTEX), methyl tert-butyl ether (MTBE), tertiary butyl alcohol (TBA), naphthalene, and Synthetic Organic Compound (SOC) groundwater impacts. The CEA extends over an approximate 4.2-acre area (maximum depth of the CEA is 50 feet bgs) which covers approximately 2/3 of the shopping center complex. The nearest (western) edge of the CEA is approximately 110 feet from the northern portion of the Project area. However, the CEA extent is based on groundwater modeling and represents the furthest distance groundwater impacts may extend over time. According to RI groundwater sampling data reviewed for the Hess site in the NJDEP SRP records, concentrations of the CEA constituents of concern (COC) have either not been detected or are well below the NJDEP Groundwater Quality Standards (GWQS) in sentinel wells (approximately 155 feet northeast and east of the proposed Project area). The monitoring wells nearest the proposed Project area that contain COC above the NJDEP GWQS are approximately 250 feet northeast of the northern extent of the Project area.

The Shell site was issued a Limited Restricted Use Response Action Outcome in March 2016 with a CEA in place for benzene, MTBE, TBA, and SOC groundwater impacts. The approximate 8,500-square-foot CEA (maximum depth of 50 feet) was established in 2004 with an approximate 18.4-year duration. The southwestern CEA

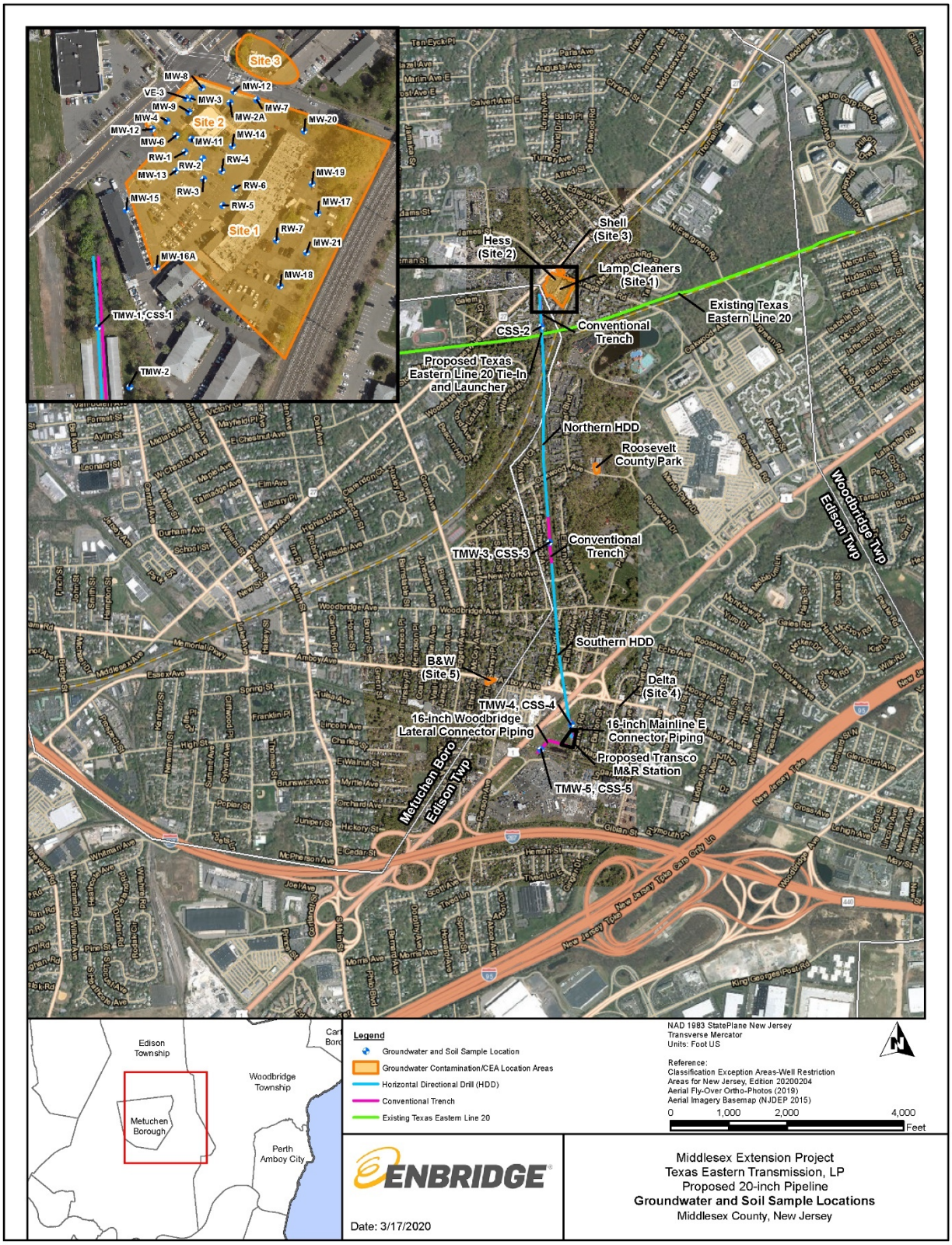
extent is approximately 560 feet northeast of the northern extent of the proposed Project area.

The Delta site was identified in the database report as an active State Hazardous Waste Site (SHWS) under program interest (PI) #032747. The site listed with Remedial Level of C2: Formal Design - Known Source or Release with groundwater contamination associated with a release that occurred in 2005. However, the extent of the groundwater impacts is unknown.

The B&W site was identified in the database report as an active SHWS site under PI #032995 with a CEA in place for BTEX and SOC groundwater impacts. The approximate 0.26-acre CEA was established 2017 with indeterminate duration and a depth of 10 feet bgs. The edge of the CEA is approximately 1,030 feet of the southern extent of the proposed Project area.

The RCP site was identified in the database report as a historic leaking underground storage tank site that was issued no further action on February 24, 1999. The NJDEP GeoWeb indicates that a CEA was established for RCP on February 25, 1999, with a duration of two years. The CEA COC consist of benzene, ethylbenzene, and xylenes, and the impacts are limited to one well onsite.

Figure 2. Existing Groundwater Contamination Sites



3.1.4 Groundwater Impact Mitigation

Conventional trenching and aboveground facility installation excavation depths have the potential to intersect shallow groundwater during construction. However, subsurface investigation borings for design of the Northern and Southern HDDs showed that groundwater occurs at depths in the range of 17 to 37 feet bgs, which would be out of the construction depths necessary for conventional pipeline trenching and aboveground facility construction, as construction depths are not anticipated to be greater than 12 feet bgs.

The greatest potential for construction to intercept shallow groundwater would be during conventional trenching and excavation at the crossing of two surface waters (S-GH-001(1) and S-GH-002), as described in section A.6.2 and B.3.2. Additionally, the aboveground facility installation excavation would occur in proximity to the two surface water crossings. However, both these waterbodies do not exhibit a perennial hydrologic flow regime, and it is anticipated that their hydrology is primarily supplied by stormwater events rather than by a groundwater component. Texas Eastern plans to cross these waterbodies by dry crossing methods (table 8).

If groundwater is intercepted during conventional trench, and/or aboveground facility construction, Texas Eastern would dewater the excavation using its E&SCP, which includes minimizing the duration the excavation remains open and discharging the groundwater to an energy dissipation and filter structure placed within a well vegetated upland area. This would mitigate surface-water runoff and associated soil erosion, and would promote water-infiltration for groundwater recharge.

Soil compaction caused by equipment traversing the construction right-of-way could potentially impact groundwater recharge. Dense compaction of soil would reduce its absorptive or retentive abilities, limiting stormwater's ability to infiltrate the soil and recharge groundwater. To mitigate impacts on stormwater infiltration and groundwater recharge caused by compaction, Texas Eastern would perform decompaction of the soil in accordance with its E&SCP, which are consistent with our Plan.

Additionally, the aboveground facilities would include permanent impervious surfaces associated with foundations; however, any impacts are expected to be minimal based on the small footprint of the foundations.

Construction of the Northern and Southern HDDs would encompass approximately 81 percent of the 20-inch-diameter Pipeline Extension, and both HDDs would reach depths of approximately 100 feet bgs, intercepting groundwater along their respective profiles below 20 to 40 feet bgs. Texas Eastern would implement its BPP for HDD along with its SPCC Plan and PPC Plan to mitigate groundwater impacts caused by the HDDs. However, as discussed in section B.3.1, there are six existing groundwater contamination sites in close proximity to the Project with the potential for a comingling

of groundwater contaminant plumes consisting of organic contaminants (see section B.1.3).

In reply to staff's environmental information requests,[18] Texas Eastern has committed to conducting soil and groundwater sampling to characterize groundwater-quality conditions/COC with respect to NJDEP Soil and GWQS. Soil samples would be collected in accordance with the NJDEP Technical Requirements for Site Remediation and with the NJDEP Linear Construction Technical Guidance, as discussed in section 2.4. Soil and groundwater would likewise be sampled for waste classification and/or surface discharge purposes at three of the Project construction locations (northern, central, and southern) where the Northern HDD, Southern HDD, conventional trench pipe installation and aboveground facility excavations are proposed. Sample locations are shown on Figure 2, and discussed below.

Northern Sampling Location Texas Eastern would collect one soil sample (CSS-1) from the Temporary Monitoring Well (TMW)-1 sampling location in the proposed Northern HDD and conventional trench area and a second would be collected at the Line 20 Tie-in location (CSS-2).

Central (between Oakwood Avenue and Ped Place) One CSS (CSS-3) would be collected in the central area of the Project near the Northern and Southern HDD exit locations and the conventional trench that connects the two HDDs. The CSS would use a combination of soft dig and Geoprobe direct push drilling methods and would be analyzed similarly to CSS-1. In addition, one groundwater sample (TMW-3)

would be collected at the CSS-3 location to analyze the potential for COC. Given that TMW-3 would be within an area of proposed conventional trenching with an anticipated maximum depth of approximately 12 feet bgs, TMW-3 would be installed to a depth of no less than 15 feet bgs using at least 10 feet of PVC riser and 5 feet of pre-packed well screen. Groundwater would be analyzed for New Jersey Pollutant Discharge Elimination System B7 COC Permit analyses.

Southern (south of U.S. Route 1) Two CSSs would be collected: one where the Line 20 Extension Southern HDD and the Mainline E Piping parallel one another (CSS-4) and the other within the Middlesex Greenway at the 16-inch-diameter Woodbridge Lateral Connector Piping location (CSS-5). Texas Eastern would collect samples utilizing a combination of soft dig and Geoprobe direct push drilling methods. Groundwater samples would be collected from TMWs installed at CSS-4 and CSS-5 soil boring locations (TMW-4 and TMW-5). TMW-4 would be advanced to a depth of no less than 15 feet bgs using at least 10 feet of PVC riser and 5 feet of prepacked well screen near the Southern HDD entry location. TMW-5 is proposed within the conventional trench line of the Woodbridge Lateral Connector Piping, with an anticipated maximum trench depth of approximately 12 feet bgs. TMW-5 would be installed to a depth of no less than

[18] Accession numbers 20200218-5188 and 20200323-5177.

15 feet using at least 10 feet of PVC riser and 5 feet of pre-packed well screen. TMW-4 and TMW-5 groundwater would be analyzed for COC according to the New Jersey Pollution Discharge Elimination System B7 Permit analyses.

Texas Eastern states that the laboratory analysis results for the planned sampling are anticipated to be completed by June 2020 with information provided to FERC by July 2020, including sampling results and procedures for testing and disposal of drilling fluids. With implementation of Texas Eastern's construction and HDD plans, its commitment to sample and analyze soil and groundwater during construction, and its proposed methods to manage and dispose of contaminated soil and groundwater, we conclude that environmental impacts on groundwater from Project construction and operation would not be significant.

3.2 Surface Water

The Project would cross one perennial stream, one intermittent stream, two ephemeral streams, and one tidal stream. Waterbodies affected by the Project are shown in table 8.

Texas Eastern would avoid impacts on stream S-HJR-004 using the proposed Northern HDD. Texas Eastern would use its BPP for HDD to mitigate any inadvertent returns during the HDD process. Direct and temporary impacts would occur on streams S-GH-001(1) and S-GH-002 during the installation of the Woodbridge Lateral tie-in piping using a conventional dry crossing method. Texas Eastern anticipates that it would cross both waterbodies within less than 48 hours.

An existing road currently crosses S-GH-001(1) and S-GH-002 within the construction right-of-way. Texas Eastern would use this road as the travel lane for equipment crossing of these surface waters during construction. Texas Eastern would cross S-GH-001(1) utilizing temporary span bridge mats and would cross S-GH-002 at the location of the existing culvert. Texas Eastern would avoid impacts on stormwater channel S-GH-001 and tidal streams NWI-1 and NWI-2 by implementing measures in its E&SCP. Specifically, Texas Eastern would install temporary sediment barriers such as silt fencing or hay bales as needed to avoid sedimentation impacts on these waterbodies.

The Project would not be within 3 miles downstream of any public water intakes, or cross any national wild or scenic rivers or navigable waters. Texas Eastern would implement measures in its E&SCP to control potential sedimentation impacts in waterbodies.

Texas Eastern would store hazardous materials and fuel and conduct spill prevention and response in accordance with its SPCC and PPC Plans.

Table 8. Waterbodies Affected by the Project								
Waterbody name	**Waterbody identification**	**Width of Impacted Waterbody (feet)**	**Flow regime**	**MP**	**Impact**	**Distance from Project**	**Facility**	**Mitigation**
Unnamed tributary (UNT) to South Branch Rahway River	S-HJR-004	6	Perennial	0.25	Avoid via HDD/ potential IR	0	Line 20 tie-in, 20-inch Extension	Avoidance by HDD
UNT to Mill Brook	S-GH-001(1)	17	Intermittent	1.55	Impacted	0	Woodbridge lateral tie-in and piping	Dry crossing method and use of E&SCP.
Stormwater channel to UNT to Mill Brook	S-GH-001(2)	NA	Ephemeral	1.55	Avoided	2	Woodbridge lateral tie-in and piping	Use of E&SCP
Storm water channel	S-GH-002	5	Ephemeral	1.55	Impacted	0	Woodbridge lateral tie-in and piping	Dry crossing method and use of E&SCP
Kings Creek	NWI-1	NA	Tidal	N/A	Avoided	65	Linden CS areas 1 and 2	Storage only, no earth disturbance, use of E&SCP
Marshes Creek	NWI-2	NA	Tidal	N/A	Avoided via culvert	0	Linden M&R	Waterbody has existing culvert in place, storage only, no earth disturbance, use of E&SCP

Impaired Waters

Stream S-HJR-004 is within the South Branch Rahway River subwatershed in the northern Project area. The South Branch of the Rahway River and its tributaries is a Clean Water Act Section 303(d) impaired water for aquatic life, fish consumption, industrial water supply and public water supply due to its non-attainment of state water quality standard thresholds for fecal coliform (EPA 2019). Texas Eastern plans to avoid this waterbody by the HDD construction method. Therefore, we conclude that Project construction would not result in increased impacts on impaired waters.

Floodplains

Review of Federal Emergency Management Agency flood maps indicates that construction of the temporary Linden M&R contractor ware yard would be within a 100-year floodplain with an elevation of nine feet above mean sea level. The remaining Project facilities, including proposed aboveground facilities would not be within flood hazard areas. The use of the temporary ware yard would not result in any permanent fill within floodplains or alterations to flood capacity.

Because none of the work proposed by Texas Eastern would permanently impact the 100-year floodplain, we conclude that impacts would not be significant and would be minimized to the extent practicable.

3.3 Drilling Water, Hydrostatic Test Water, and Dust Control Water

Texas Eastern states in its revised BPP for HDD[19] that it would use about 325,000 gallons of water obtained from the Middlesex Water Company for both source water for drilling and for hydrostatic test water. Texas Eastern would discharge hydrostatic test water into upland locations in accordance with its E&SCP and its water discharge permit from the NJDEP. We conclude that hydrostatic test water withdrawal and discharges would not impact surface water or groundwater resources in the Project area.

3.4 Wetlands

Texas Eastern conducted wetland delineation surveys in May, June, and October 2019, and identified that no wetlands are within proposed construction workspaces. However, two palustrine emergent wetlands were identified within 5 and 15 feet from the proposed Transco M&R Station and Woodbridge Lateral tie-in piping. Texas Eastern would implement measures outlined in its E&SCP to mitigate potential sedimentation impacts on wetlands. These measures include the installation of temporary sediment barriers such as silt fencing and hay bales.

Based on Texas Eastern's proposed mitigation, we conclude that impacts on surface waters, impaired waters, floodplain areas, and wetlands would not be significant.

[19] Texas Eastern Response to FERC May 1, 2020 Data Request. Filed May 8, 2020; Accession Number 20200508-5061.

4.0 FISHERIES, VEGETATION, AND WILDLIFE

4.1 Fisheries

Waterbodies S-HJK-004 (perennial) and S-GH-001(1) (intermittent) are classified as warmwater fisheries. No wild trout streams or wilderness trout waters, as classified by the NJDEP, were identified, and no Essential Fish Habitat occurs within the Project area. Texas Eastern plans to cross S-HJK-004 by HDD, which would avoid impacts on fisheries (see appendix B). Texas Eastern would cross S-GH-001(1) when the waterbody is dry using a conventional trench crossing method, or if water is present, using a dry-ditch crossing method between June 1 and November 30 to minimize impacts on spawning fish. Following construction, S-GH-001(1) would be restored to its original contours and stabilized in accordance with Texas Eastern's E&SCP. Given the limited potential impacts on fisheries associated with this Project and Texas Eastern's proposed mitigation, we conclude Project impacts on fisheries would be temporary and not significant.

4.2 Vegetation

The primary vegetation/habitat types that would be affected during Project construction and operation are upland forest, maintained right-of-way, and developed land. Table 9 shows the estimated acreage of impacts from Project construction and operation.

Upland Forest

Upland forest is primarily in the northern portion of the Project area. Tree species observed include Eastern red cedar, green ash, red maple, pin oak, red oak, and sweetgum. Understory species observed were saplings from the above-mentioned trees and multiflora rose, Allegheny blackberry, poison ivy, Virginia creeper, and ragweed.

Maintained Right-of-Way

Most of the proposed Project area is collocated with an existing utility right-of-way consisting primarily of herbaceous plant species. The majority of the utility right-of-way, especially in the middle and southern Project areas, are frequently mowed and kept in a condition similar to a residential lawn. Areas in the northern utility right-of-way, south of the railroad corridor, are maintained less frequently and display meadow characteristics. Maintained lawn utility right-of-way is adjacent to dense residential communities, and many of the residences use the utility right-of-way as part of their lawn. The maintained lawn area contains a variety of grass species including bluegrass, ryegrass, crab grass, timothy, orchard grass, switch grass, Fescue, great plantain, narrowleaf plantain, and bird's foot trefoil. The less frequent maintained areas include golden rod, ragweed, Japanese knotweed, thistle, and poison ivy species.

Table 9. Vegetation/Habitat Types Impacted by the Project

Facility	Upland Forest/ Woodland		Palustrine Emergent Marsh		Maintained Utility ROW/ Residential Lawn		Gravel/ Pavement		Project Total	
	Con.[a]	Op.[b]	Con[a]	Op.[b]	Con[a]	Op[b]	Con[a]	Op.[b]	Con[a]	Op.[b]
Pipeline	0.6	0.4[c]	0.0	0.0	8.2	1.8	1.8	0.4	**10.6**	**2.6**
Aboveground Facilities	0.8	0.3	0.0	0.0	5.8	2.1	0.0	<0.1	**6.6**	**2.3**
Access Roads	0	0	0	0	0.23	0.12	0	0.47	0.23	0.59
Total	**1.4**	**0.7**	**0.0**	**0.0**	**14.2**	**4.0**	**1.8**	**0.9**	**17.43**	**5.5**
Linden M&R Station	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	**1.3**	0.0
Linden CS – Area 1	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	**0.5**	0.0
Linden CS – Area 2	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	**1.3**	0.0
Total	**0.0**	**0.0**	**0.0**	**0.0**	**1.3**	**0.0**	**1.8**	**0.0**	**3.1**	**0.0**
Project Total	**1.4**	**0.6**	**0.0**	**0.0**	**15.6**	**4.0**	**3.6**	**0.9**	**20.5**	**5.5**

Impact units are in acres.
a: Con. = Construction. Includes areas where earth disturbance is proposed. This includes areas which would remain as permanent easement during operation of the pipeline and
aboveground facilities. Construction increases are located primarily at Ped Place and Mainline E. HDD areas would be used for monitoring during pipe installation and would not incur
earth disturbance.
b: Op. = Operation. Areas within permanent easements. Adjustments have been made to account for changes to permanent easement at pipeline and aboveground facility locations,
primarily at the Line 20 Tie-In and Mainline E Tie-in facilities.
c. Forest within the permanent easement of the pipeline installed by HDD and is not cleared or maintained as herbaceous cover

ROW = right-of-way

Construction in the northern portion of the Project area would involve temporary and permanent impacts on upland forest habitat resulting in 1.4 acres of construction disturbance and 0.6 acre for operation. However, Texas Eastern would avoid the 0.1 acre of construction and operational impacts on forested land utilizing HDD construction. The proposed tie-in with Line 20 consists of a graveled fenced-in area. With the exception of the 0.6 acre of forested conversion to herbaceous and scrub/shrub species, the pipeline corridor would retain the same vegetation type following construction. At the southern portion, the Transco M&R would convert 4.0 acres of maintained utility corridor to gravel. The two tie-ins with the Transco and Woodbridge Lateral would have small graveled fenced-in areas.

To support Project construction, Texas Eastern would use two properties it owns as off-site contractor ware yards. Texas Eastern does not propose any ground disturbance from use of these areas.

Invasive plant species are currently present within the construction right-of-way. Texas Eastern would implement mitigation measures to avoid the spread of exotic and invasive plant species during construction and restoration of the Project. The management and control measures include:

- following Texas Eastern's E&SCP to minimize soil movement and the associated movement of non-native seeds and plant material;
- using techniques that minimize the time that bare soil is exposed, thus minimizing the opportunity for exotic species to become established; and
- monitoring disturbed sites following construction to successfully revegetate with suitable cover seed mixes and to minimize establishment of invasive or exotic species.

Texas Eastern does not propose to remove or eliminate invasive species from the area, given the limited area of vegetation disturbance. As discussed, Texas Eastern would implement its E&SCP to control the spread of invasive species. Given the limited area of disturbance, Texas Eastern's implementation of its E&SCP (including its restoration measures), its proposed use of HDD (which would minimize vegetation impacts) and its measures to minimize the spread of invasive species, we conclude Project impacts on vegetation or the spread of invasive species would not be significant.

4.3 Wildlife

The Project area consists of forest/woodland, maintained right-of-way, surface water, and developed land (as shown in table 10). Representative wildlife includes a limited number of mammalian and avian species that are generally habituated to a developed, residential/semi-urban environment mixed with patchy wooded areas. Short-term, long-term, and permanent impacts on wildlife resources and habitat could result from construction and operation of the Project. These impacts generally include habitat and forage removal, ground disturbance, increased human activity and noise levels, and operational maintenance activities (e.g., mowing). Mobile wildlife would be temporarily displaced to nearby habitats due to construction activities. Less mobile species, including small mammals, may suffer mortality from construction activities. Texas Eastern would use previously disturbed areas for most workspaces, access roads, and storage/contractor yards to minimize impacts and restore them to their prior condition after construction is complete (with the exception of the small aboveground facilities).

We conclude that any Project impacts on local wildlife would not be significant due to the minimal disturbed area, Texas Eastern's commitment to restore the disturbed areas in accordance with its E&SCP, and its construction practices (including HDD) that would further minimize impacts on wildlife and its habitat.

4.4 Threatened and Endangered Species and Migratory Birds

Threatened, Endangered, and Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA, as amended, and those species that are state-listed as endangered or threatened. Section 7 of the ESA requires that the lead federal agency ensures that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. FERC, as the lead federal agency for NEPA review of the Project, is required to consult with the U.S. Fish and Wildlife Service (USFWS) to determine whether any federally listed endangered or threatened species or any of their designated critical habitat are near the projects and to determine the proposed action's potential effects on those species or critical habitats. If FERC determines that the project would have *no effect* on a listed species, further consultation with the USFWS is not required.

A review was completed through the USFWS New Jersey Ecological Field Office's project screening website tool which identified the Indiana bat and northern long-eared bat (NLEB) as potentially occurring within the Project area.

Indiana Bat

Summer habitat for the Indiana bat includes small to medium river and stream corridors with well-developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. This species uses caves and mines as hibernacula.

Texas Eastern's use of the screening questions provided by the USFWS New Jersey Field Office's screening chart determined that the Project would have *no effect* on the Indiana Bat, as it has not been observed in Middlesex County. However, the USFWS New Jersey Field Office recommended a tree clearing timing restriction of April 1 to September 30 for the Indiana bat in order to ensure no impacts on bats during the pup season. We agree that a *no effect* determination for the Indiana bat is warranted and appropriate, as long as Texas Eastern observes the USFWS tree clearing timing restriction. However, Texas Eastern has not made a firm commitment to avoid construction during the summer bat roosting season, nor provided any additional mitigation measures or provided results of any consultation with the USFWS that would meet Section 7 consultation completion requirements while allowing summer construction[20]. Therefore, **we recommend that:**

[20] If tree clearing were to take place during the indicated summer window, then FERC would have to complete additional Section 7 consultation with the USFWS before Project construction could proceed.

- **<u>Prior to construction</u>, Texas Eastern should file a commitment to restrict any tree clearing activities between April 1 and September 30, to minimize potential impacts on federally listed bat species.**

Northern Long-Eared Bat

The NLEB was federally listed as threatened by the USFWS on April 2, 2015, due to dramatic population declines attributed to white-nose syndrome. The bat is medium sized with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. During winter, these bats use large caves and mines that have large passages and entrances, constant temperatures, and high humidity with no air currents. In the summer, NLEBs roost underneath bark, in cavities, and in crevices of live and dead trees that either retain their bark or provide suitable cavities or crevices.

Texas Eastern used the New Jersey Field office's screening chart for the NLEB, and was prompted to use the 4(d) Rule Consistency form to comply with the 2016 Programmatic Biological Opinion for this species. According to the USFWS Final 4(d) Rule, incidental take is prohibited if it occurs within a hibernaculum, if it results from tree removal activities within 0.25 mile of a known hibernaculum, or if it results from removal of a known occupied maternity roost or trees within 150 feet of the maternity roost during the pup season.

Though the Project area would occur within a known white-nose syndrome zone, it would not take place within a 150-foot-radius of maternity roost trees or involve removal of trees within 0.25 mile of known hibernaculum. In addition, should any NLEBs be inhabiting the Project area, our tree clearing time-of-year restriction recommendation above would eliminate potential impacts on these bats. As such, we conclude that the Project would have *no effect* on the NLEB.

<u>Migratory Birds</u>

Migratory birds are protected under the Migratory Bird Treaty Act (16 United States Code sections 703-711), which prohibits the intentional taking of any migratory bird, or a part, nest, or eggs of any such bird, except under the terms of a valid permit issued pursuant to federal regulations. Bald and golden eagles are additionally protected under the Bald and Golden Eagle Protection Act (16 United States Code sections 668-668d). Executive Order No. 13186 (66 Federal Register 3853), directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse effects on migratory birds through enhanced collaboration with the USFWS. Executive Order No. 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors and that particular focus should be given to addressing population-level impacts. On March 30, 2011, the USFWS and the Commission entered into a Memorandum of Understanding that focuses on avoiding or minimizing adverse effects on migratory birds

and strengthening migratory bird conservation through enhanced collaboration between the two agencies.

In accordance with Executive Order No. 13186 and the Memorandum of Understanding, eight Birds of Conservation Concern (BCC) species were identified within Bird Conservation Region (BCR) 30, where the Project is proposed. The identified BCC species include the bald eagle, cerulean warbler, prairie warbler, rusty blackbird, woodthrush, glossy ibis, little blue heron, and the snowy egret. Based on biological field surveys, there is no suitable bald eagle habitat within any project areas. No habitat was identified for any of the other BCC species; however, foraging habitat (surface water) was identified for the glossy ibis, little blue heron and the snowy egret. To minimize impacts on these species, Texas Eastern would restore and revegetate the banks of any impacted surface waterbody to pre-construction contours after Project construction. Further, breeding habitat (mature and mixed forests) was identified for the woodthrush. We have recommended above that Texas Eastern avoid tree clearing between April 1 and September 30 to protect federally listed bats, which would also serve to minimize any impacts on nesting birds. However, if Texas Eastern were to request a variance from FERC to allow the clearing of trees within the summer breeding season for migratory birds (including the woodthrush), Texas Eastern states it would conduct nest surveys and contact the USFWS and obtain all applicable authorizations before trees are felled. We would review this information before considering approval of any such variance request.

Although construction activities may cause some migratory birds to avoid the Project area during construction, impacts would be limited to the relatively short construction period encompassed by Texas Eastern's proposed construction schedule and our recommended tree clearing timing restriction for federally listed bat species.

Based on the relatively small area of disturbance and the availability of similar adjacent habitats in the Project area, we conclude that impacts on migratory birds from construction would be minimal and not result in population-level impacts. During Project operation, Texas Eastern's E&SCP prohibits routine vegetation maintenance clearing between April 15 and August 1 of any year, which would minimize impacts on migratory birds from Project operation.

5.0 LAND USE AND VISUAL RESOURCES

5.1 Land Use

Land use within the Project area consists of residential land, recreational land, industrial/commercial land, and upland forest/woodland. Forested land is discussed above in the vegetation section. Acreages for each type can be found in table 10.

Table 10. Land Use Impacts

Facility	Upland Forest/ Woodland		Recreational		Industrial/ Commercial		Residential		Project Total	
	Con.[a]	Op.[b]	Con[a]	Op.[b]	Con[a]	Op[b]	Con[a]	Op.[b]	Con[a]	Op.[b]
Pipeline	0.58	0.27 0.08[c]	0.21	0.06	8.79	2.00	1.00	0.18	**10.65**	**2.61**
Aboveground Facilities	0.77	0.26	0.00	0.00	5.78	2.08	0.00	0.00	**6.55**	**2.34**
Access Roads	0.00	0.00	0.00	0.00	0.00	0.55	0.23	0.04	0.23	0.6
Total	**1.35**	**0.61**	**0.21**	**0.06**	**14.57**	**4.63**	**1.23**	**0.22**	**17.43**	**5.54**
Linden M&R Station	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	**1.33**	**0.00**
Linden CS – Area 1	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	**0.45**	**0.00**
Linden CS – Area 2	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	**1.32**	**0.00**
Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.10**	**0.00**	**0.00**	**0.00**	**3.10**	**0.00**
PROJECT TOTAL	**1.35**	**0.61**	**0.21**	**0.06**	**17.67**	**4.63**	**1.23**	**0.22**	**20.53**	**5.54**

All Impact units are in acres.

a. Con = Construction. Construction right-of-way includes areas where earth disturbance is proposed. HDD areas would be used for monitoring during pipe installation and would not incur earth disturbance. This includes areas which would remain as permanent easement during operation of the pipeline and aboveground facilities. Construction increases are located primarily at Ped Place and Mainline E

b.Op = Operation. Areas within permanent easements. Adjustments have been made to account for changes to permanent easement at pipeline and aboveground facility locations, primarily at the Line 20 Tie-In and Mainline E Tie-in facilities

c. Forest within the permanent easement of the pipeline installed by HDD which would not be cleared or maintained by the project (i.e., no tree cutting or mowing).

Residential Areas

Residential land use is characterized by single-family or multi-family housing using lawn, sidewalks, and streets. Texas Eastern would co-locate the northern Project extent directly east of an existing utility right-of-way. A residential apartment complex is directly west of the utility right-of-way and contains a driveway that crosses the utility right-of-way to the east providing access to associated parking and storage garages for its residents. This area is characterized as a combination of industrial/commercial and residential land uses. Also associated with the residential apartment complex is a wooded area to the east of the utility right-of-way, north and south of the residential storage garages. The Project would temporarily impact these land uses during construction of the Northern HDD, and construction and installation of the Line 20 Tie-in, and the 20-inch Extension.

Construction would commence in January of 2021, and the Project is scheduled to be in service by September 2021. In section B.7.10, we are recommending that Texas

Eastern conduct daytime only construction activities outside of the noise-mitigated HDD entry points. However, HDD activities beneath the Northern HDD crossing of two railroad corridors is one activity that may require continuous operation (see section A.5.0). Moreover, in order to minimize impacts on residents within the closest Noise Sensitive Areas (NSA) to such activity, Texas Eastern would provide advanced written notification informing the residents of the planned activities and the expected duration of such activities. Texas Eastern would restore the industrial/commercial and residential land uses to their previous existing conditions following construction in accordance with its Project-specific E&SCP.

Construction impacts would primarily consist of temporary increases of traffic, dust, noise, and the presence of construction equipment, and would cause indirect impacts on residents along the construction right-of-way where HDD, conventional trenching, and aboveground facility installation is proposed.

The Project would cross within approximately 50 feet of 47 residences. One of these residences is a multi-unit apartment complex. Of the 47 residences, four are within 25 feet. Residents at the apartment complex near the proposed Line 20 Tie-in would be temporarily impacted by the equipment access and facility installation, but due to the Project lay-out, these impacts have been minimized to only those residents that use the parking lot and garages within the construction right-of-way at the northern Project extent. Construction noise is discussed further in section B.7.10 of this EA.

Texas Eastern is required to comply with landowner notification requirements set forth in 18 CFR 157.6(d). Texas Eastern states that during construction it would implement its Project-specific E&SCP for residences within 50 feet of project construction. Texas Eastern has provided site-specific plans for residences that are within 25 feet of proposed workspaces. Texas Eastern's site-specific residential construction plans for structures within 25 feet of the construction work area are included in appendix E, and we invite landowners to comment on their respective plans. Specifically, Texas Eastern would implement the following measures to minimize impacts on residences:

- limit construction activities to daytime hours (7:00 am to 7:00 pm), except for HDD activities requiring continuous operation such as crossing beneath passenger and freight rail lines (see section A.5.0);
- fence the edge of the construction work area for 100 feet or up to public roadways on either side of a residence within 50 feet of the construction right-of-way;
- maintain a minimum of 25 feet between the residence and construction right-of-way for a distance of 100 feet or up to public roadways on either side of the residence, where possible;

- avoid removal of mature trees and landscaping within the construction right-of-way unless necessary for safe operation of construction equipment, or as specified in landowner agreements. Tree trimming would occur to allow for safe operation and passage of construction equipment. Any vegetation cleared from a property would be disposed of in accordance with applicable landowner agreements;
- restore lawns and landscaping to pre-construction conditions in accordance with applicable landowner agreements. Walls or other structures damaged or removed during construction would be replaced in accordance with applicable landowner agreements;
- use all measures necessary to ensure that utilities are not disrupted during construction. If it is not possible to avoid disruption of utilities, Texas Eastern would provide as much notice as possible to any affected landowner prior to the disruption;
- allow permanent re-vegetation to occur at the first seasonal opportunity;
- provide timely notification to directly affected landowners and abutters prior to the start of construction and keep the landowners apprised of planned activities and completion dates;
- maintain traffic flow and emergency vehicle access on residential roadways and use traffic detail personnel and/or detour signs where appropriate;
- place highly visible fences around excavations and/or cover the excavation if proposed to be left open overnight or for an extended time;
- inspect road surfaces frequently, and clean soil and other debris caused by the Project activities; and
- monitor the full length of each HDD during the HDD installation process to identify IRs, in accordance with the Projects BPP for HDD (see section B.1.4.3).

In the event that construction activities related to the Project adversely affect a landowner and/or their residence and cannot be mitigated by other means, Texas Eastern has committed to provide temporary alternate lodging expenses and meals, consistent with U.S. General Services Administration per diem allowances for Middlesex County, New Jersey.

Increased amounts of construction-related traffic may also occur during Project construction. To minimize impacts caused by increased traffic, Texas Eastern would work with local authorities and perform traffic control as necessary to avoid and minimize impacts on the public.

With these measures, as well as our additional recommendations in section B.7.10 regarding the Project's construction noise, we conclude that impacts from construction

and operation of the Project on residences would be mostly temporary, minimized to the extent practicable, and not significant.

As discussed in section A.1.3, we received a comment from Mr. David Shalit, the General Manager of the Metuchen Manor Garden Apartments expressing his concerns with potential odors associated with venting of Project facilities. The mainline valve for the Line 20 interconnect would be partially on the Metuchen Manor Garden Apartment Complex, approximately 100 feet from the nearest residence. The proposed fenced Line 20 Tie-in facility and pig launcher facility would be approximately 170 feet from the nearest Metuchen Manor Garden Apartment Complex residence, on the opposite side (east) of the electric utility right-of-way (the Metuchen Manor Garden Apartment Complex property is bisected by the utility right-of-way).

In reply to this scoping comment, Texas Eastern states that it strictly adheres to its Standard Operating Procedures for purging activities which specifically address purging facilities with odorized gas. Texas Eastern uses a combination of noise silencers, charcoal deodorizers and blowdown trailers to support purging activities in order to minimize the noise and odor impact on nearby residents. Purging activities would only take place when Texas Eastern operations personnel are on site. Purging activities of odorized gas would be limited when possible to the hours between 6 a.m. and 7 p.m. Additionally, these activities would be infrequent, expected to occur periodically to align with Texas Eastern's Standard Operating Procedures and maintenance needs, conducted in compliance with DOT requirements. Texas Eastern operations right-of-way personnel would contact landowners prior to such activities.

Recreational Land

Recreational land is characterized as land that is available to the public with the general purpose of providing enjoyment for those that use it. Recreational land may be active (e.g., playground facilities or sports field) or passive (e.g., nature trails or open land set aside for public use). The industrial/commercial land use within the Project boundaries is also combined with the Middlesex Greenway, a recreational land use area at the Project's southern extent. No aboveground facilities or PARs would be within the Greenway property. Construction right-of-way and permanent easements would impact the Greenway property during installation of the Woodbridge Lateral Tie-in Piping; however, neither construction nor operation would impact the Greenway itself, as the construction right-of-way is proposed in an area where the Greenway is elevated for the trail to cross over Route 1. All areas within the Greenway property, including the stream/drainage, would be restored to their exiting conditions once construction is complete.

Industrial/Commercial Land

Industrial/commercial land use is characterized as developed land that is not residential. Industrial/commercial land use includes manufacturing facilities, processing

plants, utilities, utility right-of-way corridors, industrial facilities, and commercial/retail facilities.

South of the Line 20 Tie-in, the 20-inch Extension would cross industrial/ commercial land represented by the freight and passenger railroad corridors and the utility right-of-way. However, these would be avoided by use of the Northern HDD, and no surface maintenance such as tree cutting and mowing is proposed. Texas Eastern observed that industrial/commercial land is also present in the middle and southern Project areas where the utility right-of-way is frequently mowed, and many of the abutting residences use the maintained utility right-of-way. Industrial/commercial land use is also present south of the Greenway. This area is also used by residents to access the Greenway from Pierson Road. The Woodbridge lateral tie-in and PAR-1.7 are proposed in this area.

Industrial/commercial land use characterizes the proposed contractor ware yards. The Linden M&R Station and the Linden CS Area 1 would use existing gravel pads. Linden CS Area 2 would use undeveloped maintained lawn. No improvements or earth disturbance are proposed.

Industrial/commercial land impacted during construction would be restored to their existing condition according to landowner agreements.

Upland Forest/Woodland

Upland forest/woodland land use is characterized as non-wetland habitat with trees that are not being used for commercial purposes. The wooded area would be impacted by the construction right-of-way and placement of aboveground facilities, with the aboveground facility being restored as a graveled fenced area and the permanent easement converted to an herbaceous cover type. The construction right-of-way outside the permanent easement would be restored per agreements with the landowner, which may include converting this wooded area to herbaceous cover type.

Public Land, Recreation Land, and Other Designated Areas

Federal Public or Conservation Land

The proposed Project is not within 0.25 mile of any Native American reservation, National Wildlife Refuges, National Forests, or National Wilderness Areas (USFWS 2019; United States Forest Service [USFS] 2019). Additionally, there are no National Parks (National Park Service [NPS] 2019a) or National Historic Landmarks (NPS 2019b) within 0.25 mile of the Project. In response to the Project's consultation request, the NPS identified that the Project is proposed within the Crossroads of the American Revolution National Heritage Area (NHA). The Crossroads of the American Revolution NHA encompasses approximately 2,155 square miles in New Jersey including 212 municipalities in 14 counties. Although the Project is proposed within this NHA, there

are no specific resources (i.e., associated historic houses, historic places, historic churches, battle sites, museums, or monuments) in the vicinity of the Project (the closest resource is over 4 miles away).

State Public or Conservation Land

Located south of Milepost 1.55, the Greenway is an approximately 3.5-mile-long recreational trail, owned and operated by Middlesex County, and constructed along a section of the former Lehigh Valley Rail Line that extends through portions of Metuchen Borough, Edison Township, and Woodbridge Township in Middlesex County. Texas Eastern's Woodbridge Lateral Tie-in would cross the Greenway beneath an elevated trail section, allowing for unobstructed use of the trail during construction. The Greenway is part of the NJDEP Green Acres Program that places lands in a permanent recreation and conservation easement. Crossing of the Greenway would require approval from Middlesex County and a "Diversion of Parkland" approval from the NJDEP.

In addition, there are four other NJDEP Green Acres Program lands within about 0.25 mile of the Project, including: Roosevelt Park (approximately 0.05 mile to the east), Oakland Park (approximately 0.1 mile to the west), Centennial Park (approximately 0.2 mile to the west), and Myrtle-Charles Park (approximately 0.27 mile southwest). Given the distance between the Project and these lands, the houses separating the park from construction (which would act as a visual and potentially noise buffer to the park), and that Texas Eastern would construct its project within existing right-of-way to the extent practicable through this area, we conclude that disruption impacts during construction and operation would not be significant.

There are no New Jersey farmland assessed parcels or preserved agricultural lands in the vicinity of the proposed Project. Edison Park in Edison Township approximately 0.4 mile north of the Project, is the nearest New Jersey state park. Due to the distance of this Park from the Project, we conclude that impacts on New Jersey farmland or New Jersey state parks.

Public conservation land in the vicinity of the contractor ware yards includes the Hawk Rise sanctuary, across Range Road from the Linden CS, and the Joseph Medwick Park, approximately 0.3 mile south of and across the Rahway River from the Linden CS in the Borough of Carteret, Middlesex County. Given the distance of the Project from these lands, we conclude impacts would not be significant.

Natural, Recreational, or Scenic Areas

The Project is not proposed near any National or State designated Wild and Scenic Rivers or National Natural Landmarks. However, three national recreation areas are near the Linden M&R Station contractor ware yard: Flannagan Field is a national recreation area approximately 0.1 mile west of the Linden CS contractor ware yard; Buchanan Street Park is directly north of the proposed Linden M&R Station; and the Veterans

Memorial Field Park/Tremley Park, is approximately 0.1 mile north of the Linden M&R Station. Temporary impacts from construction would be caused by increased traffic, but any impacts are anticipated to be temporary. Texas Eastern would provide traffic control in these areas as needed.

Contaminated and Hazardous Waste Sites

Texas Eastern reviewed NJDEP online database resources and obtained an EDR report to identify known contaminated sites within 0.25 mile of the Project area. Six sites were identified with known contamination: one with known soil contamination; and five with known groundwater contamination. Section B.2.4 discusses soil contamination issues present within planned Project work areas and potential impacts on Project construction; and section B.3.1.3 discusses existing groundwater contamination within the Project area, and potential impacts on Project construction.

Coastal Zones

The proposed Project construction right-of-way and permanent facilities would not occur within coastal zones. However, the Project's contractor ware yards are within New Jersey's coastal zone, and are thus subject to New Jersey's Coastal Zone Consistency Review. Therefore, FERC must confirm Texas Eastern's receipt of this determination prior to authorizing construction. Because these determinations have not yet been received by Texas Eastern, **we recommend that:**

- **Prior to construction, Texas Eastern should file with the Secretary a copy of the determination of consistency with the Coastal Zone Management Plan issued by the NJDEP.**

5.2 Visual Resources

Project activities would not occur within any federal, state, or locally designated scenic areas, such as National Wild and Scenic Rivers and scenic roads/highways. As discussed above, the Veterans Memorial Field Park/Tremley Park is approximately 0.1 mile north of the existing Linden M&R Station. Temporary impacts from construction would be caused by increased traffic, but any impacts on visual resources at this location are anticipated to be temporary. Impacts on visual and/or aesthetic resources would primarily occur during construction as a result of vegetation clearing and the presence of construction equipment within the construction right-of-way. These impacts would cease following the completion of construction and successful restoration. Minor visual impacts would occur upon completion of the Project as the new aboveground facilities would be at the northern and southern Project extents. The aboveground facilities are proposed within or directly adjacent to existing utility rights-of-way. At the Line 20 Tie-in and Transco M&R, visual screening using fencing is proposed. Use of fencing would be contingent upon final approval by the landowner through Texas Eastern's ongoing landowner negotiations.

We conclude visual impacts from construction would be temporary, and permanent impacts would not be significant.

5.3 Environmental Justice

The EPA requested that the EA analyze impacts on any environmental justice communities in the Project area. Texas Eastern conducted an economic impact study of the Project[21] which concluded that the Project would not result in disproportional negative impacts on the health, social conditions or economic conditions on minority or low-income communities. Our review of this information is presented below.

Texas Eastern's assessment of the potential for the Project to disproportionately impact minority or low- income populations indicates that the percent of the population below poverty level for the Project area is less than the state average overall, and that all Project-area census tracts have a population below the poverty level in the 0 to 10 percent range (table 11). This is not considered to be an environmental justice community based on income.

Table 11. Project Area Income During 2013 to 2017

Location	Median Household Annual Income	Per Capita Income	Percent of Individuals Below Poverty Level
New Jersey	$76,475	$39,069	10.7%
Middlesex County[a]	$83,133	$36,558	8.6%
Edison Township[a]	$95,622	$41,441	5.3%
Metuchen Borough[a]	$116,632	$56,905	2.1%
Union County[b]	$73,376	$38,163	10.3%
City of Linden[b]	$66,538	$28,285	10.3%

In the vicinity of the Project, the percent of the population identified as a racial minority is slightly higher than the state average overall. In the northern-most tract of the 20-inch Extension there is a minority population that is greater than 75 percent. However, minority populations are located throughout Middlesex County, with higher minority populations concentrated near the cities (e.g., Perth Amboy to the east of the Project and New Brunswick to the west).

The proposed contractor ware yard locations within the City of Linden, Union County, New Jersey are located within an existing compressor station location and M&R station location. The Project's use of these areas would be short-term and temporary. Review of the statistics presented within table 11 reveals that Union County and the City

[21] Accession Number 20191219-5253.

of Linden have a slightly smaller percentage of individuals below the poverty level than the state of New Jersey. Demographically, as detailed in table 12, the City of Linden's racial and ethnic distribution is similar to Union County.

Regardless of the racial and income composition of the Project area, the Project would not result in disproportional negative impacts on the health, social conditions, or economic conditions of minority or low-income communities in the vicinity of the 20-inch Extension or in the vicinity of the contractor yards. The majority of activities are confined within the limits of existing utility rights-of-way, and contractor ware yards have supported similar construction events in the past and/or occur within industrial settings. As discussed in this EA, construction and operation of all new Project facilities would have minimal environmental impacts.

Table 12. Race and Ethnicity in the Project Area

Location	Percent of Total Population								
	One Race						Two or More Races	Hispanic or Latino (of any race)	White Alone (Not Hispanic or Latino)
	White	Black/ African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Some other Race			
New Jersey	67.9	13.5	0.2	9.4	0.0	6.4	2.6	19.7	56.1
Middlesex County[a]	59.5	10.0	0.2	24.0	0.0	3.8	2.4	20.4	44.3
Edison Township[a]	36.4	7.1	0.3	49.0	0.0	4.0	3.3	9.6	31.7
Metuchen Borough[a]	75.7	5.2	0.0	14.7	0.0	1.4	3.1	7.0	70.9
Union County[b]	56.6	21.1	0.3	5.0	0.0	14.4	2.5	30.7	40.7
City of Linden[b]	53.7	30.0	0.3	3.9	0.1	9.2	2.9	30.2	34.4

Source: U.S. Census Bureau 2017
a. Project location
b. Contractor ware yard location

6.0 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act, as amended, requires the FERC to take into account the effects of its undertakings on properties listed, or eligible for listing, on the National Register of Historic Places (NRHP), and to afford the Advisory Council on Historic Preservation an opportunity to comment. Texas Eastern, as

a non-federal party, is assisting the FERC in meeting our obligations under Section 106 and its implementing regulations at 36 CFR 800.

6.1 Cultural Resources Investigation

Texas Eastern completed a cultural resources survey for the Project and provided a survey report to the FERC and the New Jersey State Historic Preservation Office (SHPO). Four historic districts that are eligible for listing in the NRHP intersect the proposed pipeline alignment. They are the Port Reading Railroad Historic District (ID #4142), the Pennsylvania Railroad New York to Philadelphia Historic District (ID #4568), the Public Service Electric and Gas (PSE&G) Company Northern Inner Ring Transmission Line Historic District (ID #5155), and the Metuchen to Trenton Transmission Line Historic District (ID #5691). One individual resource, the Metuchen Transmission Towers, would be crossed by the pipeline and contributes to the eligibility of the PSE&G Company Northern Inner Ring Transmission Line Historic District. A second nearby individual resource, the Metuchen-Brunswick 230 kilovolt (kV) Electrical Transmission, also contributes to the eligibility of the PSE&G Company Northern Inner Ring Transmission Line Historic District, but would not be intersected by the pipeline. A third nearby resource, the PSE&G Metuchen Sub-Station (ID #5157), is individually eligible for the NRHP, but likewise would not be intersected by the pipeline.

Texas Eastern would use the HDD method to avoid the portions of the Project area where the districts and individual resources were previously described. Based on the results of the cultural resources investigations, Texas Eastern recommended that the Project would not have a direct or indirect effect on any historic properties. On January 27, 2020, the SHPO commented on the survey report and agreed with Texas Eastern that no historic properties would be affected by the Project. We agree with the SHPO and have determined that the Project would have no effect on historic properties or districts.

6.2 Native American Consultation

Texas Eastern sent Project notification letters to three federally recognized Native American Tribes and informed them about the Project on April 25, 2019. The three Tribes include: the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge-Munsee Band of Mohicans. The letters introduced the Project and provided Project mapping. A Project update letter was provided to the Tribes on October 14, 2019, informing the Tribes of minor changes to the proposed Project alignment as well as providing the locations of the proposed contractor ware yards.

The Delaware Nation responded to Texas Eastern on May 17 and December 5, 2019, indicating that the location of the proposed Project does not endanger cultural or religious sites of interest to the Delaware Nation. The Delaware Tribe of Indians responded to Texas Eastern on December 12, 2019, indicating interest in the Project and requested information on which areas would be outside collocated energy corridors. Texas Eastern responded on December 12, 2019, informing the Tribe that 100 percent of

the Project would be collocated within existing energy corridors. The Stockbridge-Munsee Band of Mohicans responded to Texas Eastern on May 28, 2019, declining to consult on the Project as it would be outside of their cultural area of interest.

On February 7, 2020, we sent our NOI to the same three federally recognized Native American Tribes. To date we have not received correspondence from any of the contacted Tribes.

6.3 Cultural Resources Stakeholder Outreach

Texas Eastern sent Project notification letters to nine potential stakeholder organizations and informed them about the Project on April 25 and July 1, 2019, and March 13, 2020. The nine potential stakeholder organizations include: Archaeological Society of New Jersey, Garden State Preservation Trust, Metuchen-Edison Historical Society, Middlesex County Division of Historic Sites and History Services, New Jersey Historic Trust, New Jersey Historical Commission, New Jersey Historical Society, Preservation New Jersey, and Crossroads of the American Revolution National Heritage Area. The letters introduced the Project and provided Project mapping. A Project update was provided to the potential stakeholder organizations on October 14, 2019, informing them of minor changes to the proposed Project alignment as well as providing the locations of the proposed contractor ware yards.

Preservation New Jersey responded to Texas Eastern via e-mail on October 29, 2019, expressing interest in the Project.

On February 7, 2020, we sent our NOI to the same nine cultural resources stakeholders. To date we have not received correspondence from any of the contacted organizations.

6.4 Unanticipated Discoveries Plan

Texas Eastern provided a plan to address the unanticipated discovery of cultural resources and human remains during construction. We requested minor revisions to the plan. Texas Eastern provided a revised plan on February 18, 2020 which we find acceptable.

6.5 Compliance with the National Historic Preservation Act

FERC has completed its compliance requirements with Section 106 of the National Historic Preservation Act for the Project. If there are any changes to the Project that have the potential to affect historic properties, further consultation under Section 106 may be required.

7.0 AIR QUALITY AND NOISE

7.1 Air Quality

Air quality would be affected by construction of the proposed Project. This section discusses the impacts on air quality from the proposed Project in Middlesex and Union, New Jersey. Texas Eastern anticipates a construction start date in January 2021 and an in-service date of September 2021. Construction during this 9-month period would result in the emissions discussed in the following section. No significant operational emissions would occur as the proposed Project does not include any significant emission sources such as compressor units or emergency generators.

7.1.1 Types of Emissions from the Proposed Project

Air quality is protected by federal and state regulations. The Clean Air Act (CAA) designates seven pollutants as criteria pollutants. These are: particulate matter (PM) with an aerodynamic diameter of 10 microns or less (PM_{10}); PM with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); carbon monoxide (CO); ozone (O_3); and lead.

The combustion processes associated with construction vehicles and equipment would directly produce some of the criteria pollutants, namely SO_2, NO_2, and CO. These processes would also result in fine particulate matter, $PM_{2.5}$, primarily as a result of the complex reactions in the atmosphere of the other combustion pollutants just mentioned. During construction, PM_{10} would also result from fugitive dust produced from moving vehicles and ground disturbance. While ground-level ozone is a pollutant that would not be directly emitted by the proposed project; it is created by the chemical reactions of other pollutants. No measurable amounts of lead would be emitted by the project during construction or operation.

In addition to SO_2, NO_2, CO, and $PM_{2.5}$, construction equipment would emit other pollutants called volatile organic compounds (VOC) and hazardous air pollutants (HAP), which are also regulated by the EPA. VOCs refer to certain compounds of carbon that participate in atmospheric photochemical reactions to create ground-level ozone. HAPs are pollutants designated by the EPA as being known or suspected to cause cancer or other serious health effects. VOCs and HAPs both result from combustion processes.

Some of the pollutants already mentioned are also designated as greenhouse gases (GHG). These are gases that trap heat in the atmosphere either directly or as a result of chemical reactions in the atmosphere, resulting in warming of the earth. Methane is itself a GHG, and any leakage of methane during the operation of the facility (referred to as fugitive emissions) would be classified as a GHG. Emissions of GHGs are typically quantified and regulated in units of carbon dioxide equivalents (CO_2e). The CO_2e takes

into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO_2. CO_2 has a GWP of 1, methane has a GWP of 25, and nitrous oxide has a GWP of 298.

7.1.2 Existing Air Quality

The EPA measures and regulates air quality by promulgating National Ambient Air Quality Standards (NAAQS), which establish acceptable concentrations in the air of the aforementioned seven criteria pollutants. The NAAQS include primary standards, which are designed to protect human health, including the health of sensitive subpopulations, such as children and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including economic interests, visibility, vegetation, animal species, and other concerns not related to human health. The current NAAQS for the criteria pollutants that would be emitted by the Project are summarized in table 13 below, which shows the status for each criteria pollutant in the counties affected by the Project.

Table 13. NAAQS for Criteria Pollutants Emitted by the Project

Pollutant [Final Rule Citation]	Primary or Secondary	Averaging Time	Level	Form
CO	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
NO_2	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual Mean
$PM_{2.5}$ Particle Pollution	Primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
	Secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
	Primary and Secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
PM_{10} Particle Pollution	Primary and Secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
SO_2	Primary	1-hour	75ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

The NAAQS are codified in 40 CFR 50. Areas of the country are designated based on compliance with the NAAQS. Designations fall under three main categories: "attainment" (areas in compliance with the NAAQS); "nonattainment" (areas not in compliance with the NAAQS); or "unclassifiable." Unclassifiable areas are treated as attainment areas for the purpose of permitting a stationary source of pollution. Areas that have been designated nonattainment but have still demonstrated compliance with the ambient air quality standard(s) are designated maintenance for that pollutant. Maintenance areas may be subject to more stringent regulatory requirements to ensure continued attainment of the NAAQS.

Table 14. Attainment Status for the Counties Affected by the Project

Air Pollutant	Middlesex County, New Jersey	Union County, New Jersey
SO_2	Attainment	Attainment
CO	Unclassified / Attainment	Attainment (Maintenance)
NO_2	Unclassified / Attainment	Unclassified / Attainment
O_3 (1997 8-hr standard)	Nonattainment (moderate)	Nonattainment (moderate)
O_3 (2008 8-hr standard)	Nonattainment (serious)	Nonattainment (serious)
O_3 (2015 8-hr standard)	Nonattainment (moderate)	Nonattainment (moderate)
PM_{10}	Unclassified	Unclassified
$PM_{2.5}$ (1997 annual standard)	Attainment (maintenance)	Attainment (maintenance)
$PM_{2.5}$ (2012 annual standard)	Unclassified / Attainment	Unclassified / Attainment
$PM_{2.5}$ (1997 annual standard)	Unclassified / Attainment	Unclassified / Attainment
$PM_{2.5}$ (2006 annual standard)	Attainment (maintenance)	Attainment (maintenance)
Lead	Unclassified / Attainment	Unclassified / Attainment

7.1.3 Regulatory Requirements for Air Quality

The Project equipment would be subject to various federal and state air quality regulations. The CAA, as amended in 1977 and 1990, and 40 CFR 50--99 are the basic federal statutes and regulations governing air pollution in the United States. These CAA regulations ensure acceptable air quality and minimize impacts on human health. They regulate the criteria pollutants, HAPs, and VOCs, as well as provide for mechanisms to monitor GHGs.

The following federal requirements have been reviewed for applicability to operation of the Project.

- New Source Review / Prevention of Significant Deterioration (PSD);
- Title V Operating Permits;
- New Source Performance Standards;
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and
- Greenhouse Gas Reporting.

Because there would not be any significant operational emissions, these federal requirements do not apply. For Project construction, we have evaluated applicability of another federal air quality program referred to as General Conformity.

7.1.4 General Conformity

The EPA promulgated the General Conformity Rule to require that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved CAA implementation plan. The only Project activities that are not potentially subject to a CAA permitting program are construction activities. Therefore, construction activities are the only Project activities that would be subject to the General Conformity Rule.

The General Conformity Rule is codified in 40 CFR Part 51, Subpart W and Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*. A conformity determination must be conducted by the lead federal agency if a federal action's construction and operational activities is likely to result in generating direct and indirect emissions that would exceed the conformity threshold (*de minimis*) levels of the pollutant(s) for which an air basin is in nonattainment or maintenance.

Section 176(c)(1) states that a federal agency cannot approve or support any activity that does not conform to an approved State Implementation Plan (SIP). Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

For this Project, a General Conformity applicability analysis is required for components in the following nonattainment and maintenance areas for Middlesex and Union Counties, New Jersey. For Middlesex County:

- Ozone (nitrogen oxides [NO_x] and VOC precursors) as part of the New York-Northern New Jersey-Long Island Nonattainment Area (moderate nonattainment for 1997 and 2015 8-hour ozone standards and serious nonattainment for 2008 8-hour ozone standards); and
- $PM_{2.5}$ (including SO_2 and NO_x precursors) as part of the New York-Northern New Jersey-Long Island Maintenance Area (maintenance of the 2006 24-hour $PM_{2.5}$ standards).

For Union County:

- CO as part of the New York-Northern New Jersey-Long Island Maintenance Area (maintenance of the 1971 CO standard).

Emissions from construction activities are aggregated and compared to the General Conformity *de minimis* emission thresholds in table 15. Because the emission rates for the proposed Project within these counties are below *de minimis* thresholds, a General Conformity determination is not required.

7.1.5 Construction Impacts and Mitigation

Construction of the Project would result in temporary increases in emissions of some pollutants due to the use of construction equipment powered by diesel or gasoline engines. Construction activities would also result in particulates in the air, mostly larger PM_{10}, in the form of fugitive dust from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated would be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions would typically be greater during dry periods and in areas of fine-textured soils subject to surface activity.

Air quality impacts associated with construction of the proposed Project would include emissions from fossil fuel-fired construction equipment, fugitive dust from land clearing and vehicles traveling on unpaved roads, and possibly emissions from clearing vegetation. Additionally, there would be venting of natural gas from pipelines for the Line 20 tie-in and commissioning of the new line and M&R facility. All air quality impacts would generally be temporary and localized. Large earth-moving equipment and other vehicles that are powered by diesel or gasoline engines are sources of combustion-related emissions, including criteria pollutants, GHGs, and small amounts of HAPs.

Although dust impacts would be temporary and minor, Texas Eastern would implement the following mitigation measures on an as-needed basis, as detailed in its *Dust Control Plan:*

- apply water (or other approved dust suppressant), as necessary, to construction sites which may create significant airborne dust;
- reduce vehicle speed on unpaved roads;
- construct and maintain construction entrances to prevent tracking mud and soil onto paved roads; and
- pave/gravel roadways, where possible, and maintain them in a clean condition.

We have reviewed Texas Eastern's *Dust Control Plan* and find it acceptable.

A summary of the estimated construction emissions for the Project is presented in table 15.

Table 15. Construction Emissions from the Project (tons per year)									
Source/Area	**County**	**NO_x**	**CO**	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**HAP**	**GHG**
Construction Activities	Middlesex, NJ	46.28	134.5	6.74	45.09	9.40	0.44	0.17	10,627.38
Blowdown/Venting		-	-	4.87	-	-	-	-	12,942.16
Total		**46.28**	**134.5**	**11.61**	**45.09**	**9.40**	**0.44**	**0.17**	**23,569.5**
On-road Vehicles	Union, NJ	0.59	1.43	0.13	51.68	8.61	0.00	0.02	277.99
General Conformality *De Minimis* Levels		100	100	50	n/a	100	100	n/a	n/a

Once construction activities in the area are completed, fugitive dust and construction equipment emissions would subside, and the Project's related impact on air quality would terminate. Furthermore, because of the implementation of the mitigation measures described by Texas Eastern and the intermittent and temporary nature of construction emissions, we conclude that the emissions from construction-related activities for the Project are not expected to cause or significantly contribute to a violation of any applicable ambient air quality standard or significantly affect local or regional air quality.

7.1.6 Operational Impacts

As discussed above, the Project would not result in any significant operational emissions. Very small amounts of fugitive emissions are possible but would not have a significant impact on regional or local air quality. Fugitive emissions from a single metering station would typically be less than 5 tons per year CO_{2e} of GHG. Therefore, we conclude that there would not be any significant regional or local impacts on air quality during operation.

7.2 Noise

Construction and operation of the proposed Project may affect local noise levels. The ambient sound level of a region is defined by the total noise generated within the specific environment, and usually comprises sounds emanating from natural and artificial sources. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and through the week. This variation is caused in part by changing weather conditions.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is an A-weighted sound level containing the same sound energy as the instantaneous sound levels measured over a specific time period. Noise levels are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Specifically, in the calculation of the L_{dn}, late night to early morning (10:00 pm to 7:00 am) noise exposures are penalized +10 decibels (dB) to account for people's

greater sensitivity to sound during the nighttime hours. The A-weighted scale (identified as dBA) is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. For an essentially steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the L_{dn} is approximately 6.4 dB above the measured L_{eq}.

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 decibels on the A-weighted scale (dBA) protects the public from indoor and outdoor activity interference. FERC staff has adopted this criterion and use it to evaluate the potential noise impacts from proposed projects at noise sensitive areas (NSAs), such as residences, schools, or hospitals. Due to the 10 dBA nighttime penalty added prior to calculation of the L_{dn}, for a facility to meet the L_{dn} 55 dBA limit, it must be designed such that actual constant noise levels on a 24-hour basis do not exceed 48.6 dBA L_{eq} at any NSA. Also, in general, a person's threshold for a perceivable change in loudness on the A-weighted scale is about 3 dBA, whereas a 5 dBA change is clearly noticeable, and a 10 dBA change is perceived as either twice or half the loud.

7.2.1 State and Local Noise Regulations

Provisions of the New Jersey Noise Control Act and New Jersey Environmental Codified Regulations (N.J.A.C. 7:29) were evaluated for this Project. In summary, N.J.A.C. 7:29 states that the continuous airborne sound at the receiving residential property line shall not exceed an A-weighted sound level of 65 dBA during the daytime (7:00 am to 10:00 pm) and 50 dBA during the nighttime (10:00 pm to 7:00 am); the FERC sound level requirement (i.e., L_{eq} of 48.6 dBA at a residence) is considered to be slightly more stringent than the New Jersey sound regulations (i.e., nighttime sound level requirement of 50 dBA) for nearby and adjacent residential properties..

Edison Township's noise ordinance is provided within Township Code Chapter 12-27 "Noise Control." It requires that there be no increased noise levels or vibration beyond the limits of the property.

The Noise Ordinance of the Borough of Metuchen (Section IX – Restricted Uses and Activities of Ordinance 2016-06) includes noise requirements similar to the noise requirements in the State of New Jersey Noise Regulations. Additionally, the local noise Ordinance requires that construction and demolition activity, excluding emergency work, shall not be performed between the hours of 6:00 pm and 7:00 am on weekdays, or between the hours of 6:00 pm and 9:00 am on weekends and federal holidays, unless such activities meet the requirements for an exception under the Ordinance. The Ordinance also requires all motorized equipment used in construction activity to be operated with a muffler and/or sound reduction device.

7.2.2 Construction Noise

Noise would affect the surrounding area during the anticipated 9-month construction period between January and September 2021for the proposed Project components. The main source of noise from this Project would be at the entry of the HDDs, where Texas Eastern proposes to employ its drill pad, however, additional noise would occur at the HDD exit points. Texas Eastern states that the intercept drilling method may be used for both the Northern HDD and the Southern HDD. As discussed in section A.6.4, an HDD intercept method is conducted by placing a drill rig and associated equipment at both ends of the HDD and drilling toward one another until the pilot hole meets. Other construction activities would be performed where conventional pipeline construction work is proposed with standard heavy equipment, such as track-excavators, backhoes, bulldozers, and dump trucks. The sound level impact at NSAs from construction activities is dependent on the type of construction equipment used, the duration of use for each piece of construction equipment, the amount of construction equipment used simultaneously, and the distance between the construction equipment and the NSAs.

Texas Eastern's proposed Northern and Southern HDDs have NSAs within 0.5 mile of the entry and exit sites:[22]

- NSA #1 (Residences near Southern HDD Entry Point): Residences are 125 feet east of the proposed entry location.
- NSA #2 (Residences near Southern HDD Exit Point): The residences are approximately 75 feet west of the proposed exit point.
- NSA #3 (Residences near Northern HDD Exit Point): Residences are approximately 75 feet west of the proposed exit point.
- NSA #4 (Residences near Northern HDD Entry Point): The residences are approximately 175 feet west of the proposed entry point.

[22] The four defined NSAs are discrete points from which Texas Eastern made meaningful noise estimates, and from which Texas Eastern can use as reference points to confirm construction noise levels. We estimate that these four NSAs would experience the loudest noise effect from the Project; however, there are a number of additional residences within 0.25 mile of the Project that would experience varying noise levels from Project construction.

Table 16. Estimated Noise Levels from HDDs					
Closest NSAs	**Distance and Direction of NSA from Project HDDs**	**Current Sound Level (Ldn)**	**Estimated Sound Level (HDD + Ambient) (Ldn)**	**Estimated Sound Level (Ldn) after Modifications (HDD + Ambient)**	**Potential Noise Increase Above Ambient**
NSA #1	125 feet (E)	65.7 dBA	80.4 dBA	68.6 dBA	2.9 dB
NSA #2	75 feet (W)	56.0 dBA	84.8 dBA	65.1 dBA	9.1 dB
NSA #3	75 feet (W)	56.0 dBA	84.8 dBA	65.1 dBA	9.1 dB
NSA #4	175 feet (W)	54.5 dBA	77.2 dBA	56.9 dBA	2.4 dB

Texas Eastern has proposed noise mitigation measures such as noise monitoring; noise suppression devices on equipment; noise attenuating walls; tent structures, alternative safety alarms on vehicles, and/or other measures. Texas Eastern notes in its application that final noise mitigation would be determined by the HDD contractor based on final plans for the HDD operations. Specifically, these measures could include:

- a temporary noise barrier 20 – 24 feet high around the HDD site workspace constructed of a sound-absorptive barrier material designed to achieve a STC 30–40 rating (e.g., a barrier designed with septum mass layer or acoustical panel system);
- residential–grade exhaust silencers on all engines in conjunction with any of the site HDD equipment, including the drill rig;
- a "close-fit" noise barrier system around the power unit and engine-driven pumps by covering the sides of the equipment with a sound-absorptive barrier material;
- a partial barrier or partial enclosure around the mud mixing/cleaning system;
- a "lower noise" mud cleaning system; and/or
- "low-noise" generators (i.e., designed with a factory-installed acoustical enclosure), especially for the generator that serves the mud mixing/cleaning system.

The predicted noise levels shown in table 16 account for use of the above mitigation measures (i.e., "after modifications"); however, Texas Eastern has not specified the final noise mitigation to date. In order to ensure that Texas Eastern uses appropriate noise mitigation and to ensure that noise levels are at the predicted levels (with mitigation) during construction, **we recommend that**:

- **Prior to construction of the Northern and Southern HDDs, Texas Eastern should file with the Secretary, for the review and written approval by the Director of OEP, or the Director's designee, an HDD noise mitigation plan to reduce the projected noise level attributable to the HDD construction at the nearest NSAs and ensure that noise levels at the HDD entry points does not**

exceed the mitigated predicted level of 3 dB over the ambient noise environment. During drilling operations, Texas Eastern should implement the approved plan, monitor noise levels and report those findings on a weekly basis, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than the predicted levels at the NSAs.

Noise levels during construction at NSA #1 and NSA #4 would increase above 55 dBA; however, the estimated increase would be below the noise level perceivable to the human ear. Although the existing noise levels at the NSAs are already at or above our threshold of 55 dBA, the predicted noise increase at NSAs #2 and #3 is over 9 dB, which is an almost doubling of perceived noise level to the human ear. Based on Texas Eastern's proposed HDD operations at the exit points (i.e., up to several months long (see section A.5.0)), the HDD-related noise levels at these HDD exit points could result in considerable impact on residents at NSAs #2 and #3. As indicated in section A.5.0 and B.5.1, Texas Eastern generally proposes to limit construction activities to daytime hours (7 am to 7 pm) where feasible. While Texas Eastern indicates that it may need to operate the HDD drilling at the noise mitigated entry locations 24 hours a day under certain circumstances, we remain concerned with any possible construction noise at the HDD exit points that could occur outside of the daytime hours. Therefore, **we recommend that:**

- **Texas Eastern should limit Project construction outside of the noise-mitigated HDD entry points to the hours between 7:00 am and 7:00 pm.**

Although the residents at NSAs #2 and #3 would still experience Project-related noise impacts, our recommendation would ensure that residents near the HDD exit points do not hear noise over 65 dB during nighttime hours. Therefore, with Texas Eastern's proposed mitigation measures and our recommendations, we conclude that impacts due to construction noise activities would not result in significant noise impacts.

7.2.3 Operational Noise

The results of the acoustical assessment indicate that the sound level attributable to the proposed M&R Station is expected to be lower than an L_{dn} of 55 dBA at the nearby NSAs and would be capable of meeting the specified requirements of the State of New Jersey Noise Regulations and other county township noise regulations with application of the appropriate noise mitigation measures. No other Project facilities would contribute to operational noise. The estimated sound levels are presented in the table 17 below.

Table 17. Noise During Operation of the Planned M&R Station						
Project Meter Station	Closest NSA and Type of NSA	Distance & Direction of NSA	Calc'd Ldn of Meter Station (via Est'd A-Wt. Level) – dBA	Ambient Level (Ldn) – dBA	Level (Ldn) of MS plus Ambient Level – dBA	Increase Above Ambient – dB
Meter Station in Utility Corridor	Residences	125 ft. (E)	46.2	65.7	65.7	0.0

As shown in the table, the predicted L_{dn} sound levels would not result in an increase of noise at the nearest NSA. We therefore conclude that there would be no significant noise impacts from the proposed Project during operation.

8.0 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture. Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

The aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures.

The DOT pipeline standards are published in 49 CFR 190-199. For example, 49 CFR 192 specifically addresses natural gas pipeline safety issues and prescribes the minimum standards for operating and maintaining pipeline facilities. Part 192 also requires a pipeline operator to establish a written emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency.

The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Texas Eastern would provide the appropriate training to local emergency service personnel before the facilities are placed in service.

As discussed in section A.3.1, Conrail provided comments expressing its concerns with Project construction and operation being in compliance with Conrail and the FRA specific safety requirements on and beneath Conrail properties and rail lines. Specifically, Conrail's concerns center around Texas Eastern's provision of detailed and comprehensive technical information on how Conrail's and FRA's safety requirements would be complied with and Conrail requests that the EA appropriately reflect these safety concerns.

On February 14, 2020, Texas Eastern filed a reply to Conrail's January 27, 2020 *Motion to Intervene and Comments*, which stated that Texas Eastern would comply with all applicable FRA and state regulations and Conrail safety guidelines, with the exception of requirements that are not relevant to Texas Eastern's proposed construction method (HDD) on Conrail property. On February 26, 2020, Conrail filed comments to the Project docket which state that it is in receipt of Texas Eastern's application for a License Agreement to occupy Conrail owned property, which include technical details responding to Conrail's safety and operational requirements, including HDD procedures and activities. In a subsequent filing on March 9, 2020, Conrail requested that the Commission's order be conditioned to reflect its concerns, and stated that Texas Eastern's submission is currently under review. Texas Eastern responded to Conrail's additional comments on March 24, 2020. Texas Eastern committed to fund an outside engineering firm to conduct an engineering review of its License Agreement application, per Conrail's request.

Texas Eastern is required to design, construct, operate, and maintain the Project to meet or exceed DOT minimum federal safety standards in CFR 49 192, as well as applicable FRA regulations and state railroad regulations. We find that the additional specifications requested by Conrail for its negotiated access agreement are outside the scope of this EA. Texas Eastern's construction and operation would represent a minimum increase in risk to the public and we are confident that with the options available in the detailed design of Texas Eastern's facilities, that they would be constructed and operated safely.

9.0 CUMULATIVE IMPACTS

Cumulative impacts may result when the environmental effects associated with a project are superimposed on, or added to, either temporary (construction-related) or permanent (operation-related) impacts associated with past, present, or reasonably foreseeable projects or activities. Although the individual impacts of each project might not be significant, the cumulative impacts of multiple projects could be significant. In accordance with NEPA, the cumulative impacts of the Project along with other projects were considered. The Project's direct and indirect impacts are described in the preceding sections of this EA.

Inclusion of other actions is based on identifying commonalities of impacts from other actions along with those of the proposed Project. An action must meet the following criteria:

- impact a resource potentially affected by the Project;
- cause the impact within all, or part of, the Project geographic scope; and
- cause the impact within all, or part of, the time span of the Project.

Existing or reasonably foreseeable actions that would affect similar resources during similar periods as the Project were considered. To evaluate potential cumulative

impacts, we considered recently completed (one year prior to construction of the Project), current, and reasonably foreseeable future projects within the vicinity of the proposed Project. We attempted to identify major projects, which include infrastructure construction, FERC jurisdictional and non FERC-jurisdictional pipeline projects, commercial and residential developments, and large industrial facilities construction and operation.

For the purpose of this analysis, we are including the following resources:

- geological resources;
- soils;
- water resources and wetlands;
- fish, wildlife, and vegetation;
- special status species;
- land use, recreation, and special interest areas;
- cultural resources; and
- air quality and noise.

The geographic scope for each resource is unique and is generally more localized for somewhat stationary resources (e.g., geologic resources and soils) and more expansive for resources with a large geographic area (e.g., air quality). Table 18 below summarizes the resource-specific geographic boundaries considered in our cumulative impact analysis for the Project, and the justification for each. Actions occurring outside these boundaries were generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Project.

Table 18. Cumulative Impact Assessment Area

Resource	Geographic Scope
Groundwater Use and Water Quality	Watershed boundary (hydrologic unit code [HUC]-12)
Surface Water and Wetlands	HUC-12 watershed.
Fish, Wildlife, Vegetation, T&E	HUC-12 watershed.
Cultural Resources	The defined "Area of Potential Effect," with a 0.25-mile buffer.
Geological Resources	0.25 mile from the Project limits of construction.
Soils	0.25 mile from the Project limits of construction.
Land Use, Recreation, and Aesthetics	A 1-mile radius from the Project.

Table 18. Cumulative Impact Assessment Area	
Resource	**Geographic Scope**
Air Quality	Due to the limited emissions generated by construction equipment, the geographic scope used to assess potential cumulative impacts on air from construction activities was set at 0.25 mile. Operation of the Project would not result in any change to local or regional air quality.
Noise	Noise impacts are highly localized and attenuate quickly as the distance from the noise source increases. The Commission's Guidance Manual for Environmental Report Preparation requires that noise impacts from aboveground facilities are evaluated at all noise sensitive areas within 1 mile. Operation of the Project would not result in any change to the local noise environment.

Appendix D summarizes the projects identified within proximity of the proposed Project having the potential to contribute to cumulative impacts. Project information provided in appendix D includes the project name and proponent, distance from the Project, scope, construction schedule, whether or not the project was considered in the cumulative impacts analysis (if not, a brief explanation as to why it is not included), and the resources that would be cumulatively impacted (taking into consideration the geographic scopes defined in table 18, above). A total of seven projects were evaluated in this cumulative impact analysis, including:

- one natural gas activity;
- three transportation activities;
- one electric transmission and distribution activity;
- one parkland, residential and commercial activity; and
- one activity characterized as "other."

For a discussion of cumulative impacts, resources have been organized by their respective geographic scopes in the following sections.

9.1 HUC-12 Watershed Geographic Scope

Watersheds are well-defined, published natural boundaries for surface water flow and commonly contribute to the recharge of groundwater resources. Thus, cumulative effects are typically studied at the watershed level. Impacts on surface waters can result in downstream contamination or turbidity, and mitigation projects to offset impacts on wetlands typically occur within the affected watershed. Therefore, the geographic scope

used to assess cumulative impacts on waterbodies, groundwater, and wetlands includes the hydrologic unit code (HUC)-12 watershed within which the Project facilities would be located and may be affected by the proposed Project activities.

The watershed level provides a natural boundary and a geographic proxy to accommodate general wildlife habitat and ecology characteristics in the Project area; therefore, impacts of other actions on vegetation, wildlife, and special status species are evaluated in combination with the Project within its HUC-12 watershed boundaries, as recommended by the Council on Environmental Quality. The proposed Project traverses two HUC-12 sub-watershed drainage areas: the Mill Brook-Raritan River watershed and the South Branch Rahway River watershed. The evaluation of potential cumulative impacts within the HUC-12 sub-watersheds that would be affected by the proposed Project included consideration of large development projects such as other pipeline or road projects and also smaller projects that are in proximity to the Project.

Groundwater

Residential and commercial development projects may use small amounts of groundwater from a public or private well but likely would source water from a local purveyor. The other projects represented in appendix D would also likely use a local water purveyor to perform construction activities in their vicinity. The local purveyor would be required to obtain, or upgrade/revise, any existing water allocation permits from the NJDEP to manage water withdrawal rates and volumes as to not significantly impact groundwater resources. Management of groundwater resources by the NJDEP water allocation permit process minimizes cumulative impacts by projects utilizing groundwater as a source of supply such that withdrawals do not exceed natural recharge replenishments of the aquifer and the water-level drawdown from increased pumping does not impact nearby users (wells and surface water).

Construction of each of the proposed projects would likely require equipment refueling and may potentially require storage of hazardous substances, which would involve a risk of a spill that could result in groundwater contamination. As is the case for the proposed Project, each identified project would require construction and environmental permits and BMPs, as applicable, to be implemented in the event that a spill occurs, or contaminated groundwater is encountered. It is expected that each identified overlapping project would have a spill plan that would minimize the potential for groundwater contamination from equipment refueling or storage of hazardous substances. Therefore, significant cumulative impacts on groundwater resources are not anticipated.

Surface Water and Wetlands

During construction, Texas Eastern would implement measures in its E&SCP to control potential sedimentation impacts in waterbodies and wetlands. Texas Eastern

would also store hazardous materials and fuel and conduct spill prevention and response in accordance with its SPCC and PPC Plans.

Construction of each of the other projects with potential cumulative impacts would likewise require the use of a project-specific E&SCP with BMPs designed to avoid, reduce and/or mitigate potential impacts on surface waters, and wetlands, and would likely require construction BMPs to be implemented in the event that a spill occurs. It is expected that each identified project within the HUC-12 watershed would have a spill plan to minimize the potential for contamination from equipment refueling or storage of hazardous substances. Because the proposed Project would not directly impact wetlands, and waterbody impacts would be mostly avoided by HDD construction and minimized during conventional pipeline crossing of streams S-GH-001(1) and S-GH-002 for the Woodbridge Lateral tie-in piping installation, any cumulative impacts as a result of the Project would be temporary and return to background conditions shortly following completion of construction activities.

Fish, Wildlife, T&E and Vegetation

Fish, wildlife, threatened and endangered species, and vegetation have been assessed using the HUC-12 subwatershed geographic scope. The proposed Project traverses two HUC-12 subwatershed drainage areas: the Mill Brook-Raritan River watershed and the South Branch Rahway River watershed. Projects that have the potential to impact environmental resources discussed herein include each of the projects listed in appendix D. The evaluation of potential cumulative impacts within the HUC-12 subwatersheds that would be affected by the proposed Project included consideration of large development projects such as other pipeline or road projects and smaller projects that are in proximity to the waterbodies that would be crossed by the Project. Projects that have the potential for overlapping impacts within Mill Brook-Raritan River watershed include:

- the Transco Interconnect Activities associated with the Middlesex Extension Project;
- the I-287 North Bridge Construction Project and Grove Avenue Bridge over Port Reading Railroad Rehabilitation Project; and
- the Ashley Furniture Store Expansion Project.

Projects that have the potential for overlapping impacts within the South Branch Rahway River watershed include:

- the Northeast Corridor Upgrades Project;
- the Sewaren-Metuchen 230kV Conversion Project; and
- the Roosevelt Park Upgrades Project.

As discussed in sections B.4.0, the Project would not directly impact fish or most wildlife. Therefore, the proposed Project would not contribute to cumulative impacts on these resources in relation to the other projects mentioned.

It is possible that any of the projects identified in appendix D could temporarily impact smaller wildlife and migratory birds, as well as vegetation resources. The proposed Project would minimize impacts on wildlife and vegetation resources through the use of an HDD trenchless pipe installation method and placement of aboveground facilities in either previously disturbed areas or in maintained utility rights-of-way. The greatest impact may come from the clearing of second growth woodland at the northern Project extent. Temporary impacts on local wildlife may occur as a result of this tree removal. Texas Eastern would implement mitigation techniques described in its E&SCP, such as revegetation.

The natural gas project, the transportation projects, the electric transmission project, and the residential and commercial development projects include improvements to existing infrastructure or are small development projects, where vegetation and wildlife impacts are expected to be minimal. The projects would be required to adhere to applicable NJDEP permits and approvals which are protective of vegetation and wildlife. Therefore, cumulative impacts are not anticipated.

9.2 0.25-Mile Radius Geographic Scope

Cultural resources, geological and soil resources, and construction air quality have been assessed using a 0.25-mile radius from the proposed Project. As listed in appendix D, projects within 0.25 mile that have the potential for overlapping impacts of the proposed Project include:

- the Transco Interconnect Activities associated with the Middlesex Extension Project;
- the I-287 North Bridge Construction Project and Northeast Corridor Upgrades Project;
- the Sewaren-Metuchen 230kV Conversion Project; and
- the Roosevelt Park Upgrades Project.

Cultural Resources

For federal undertakings, cumulative impacts on cultural resources can be avoided and minimized through implementation of Section 106 of the NHPA. For non-federal projects, the NJDEP process would require consultation with the New Jersey SHPO and avoidance and minimization measures through the state permit process.

As discussed in section B.6.0, the Project would not have a direct or indirect effect on any historic properties. On January 27, 2020, the SHPO commented on the survey report and agreed with Texas Eastern that no historic properties would be affected by the

Project. We agree with the SHPO and have determined that the Project would have no effect on historic properties or districts. As such, Texas Eastern' s Line-20 Middlesex Extension Project would not incrementally contribute to cumulative impacts with the other identified proposed projects within 0.25 mile.

Geologic and Soil Resources

As discussed in section B.1.0, the Project would not affect mineral resources in the Project area or be affected during construction or operation of the proposed natural gas facilities by natural geologic hazards. Unforeseen impacts from events such as landslides, subsidence, flash flooding, or soil liquefaction, hazards with low probability of occurrence in the Project area, would, if present, be avoided based on information acquired during geophysical studies and implemented in the respective Project plans. The potential for IRs to occur during HDD would be minimized with Texas Eastern's BPP for HDDs. As such the Project would not contribute incrementally to cumulative impacts on geologic resources.

Cumulative impacts on soils are expected to be minimal. The other projects mentioned above would be constructed in accordance with applicable permits, and approved engineering design, which would minimize impacts on soils. Any Project impacts on soils would be mitigated through Texas Eastern's use of the BMPs in its E&SCP during construction to minimize erosion and other construction impacts. In addition, unforeseen impacts would be minimized using proper construction techniques and monitoring by qualified and trained EIs.

In addition, the New Jersey Department of Agriculture, requires that all construction activities greater than 5,000 square feet to be developed in accordance with a plan to control erosion during construction.[23] The plan must also ensure that erosion would not occur once construction is completed. Adherence to these plans would minimize the potential for each of the identified projects to negatively impact geologic and soil resources. Therefore, the projects would not incrementally contribute to significant cumulative impacts on soil resources.

Air Quality and Construction-Related Air Emissions and Fugitive Dust

There would be no combustion-related operational emissions associated with the Project. The only operational emissions would be fugitive (non-point-source) and venting/blowdown emissions. Venting/blowdown emissions would be below New Jersey air permitting thresholds. Because the Project is not a source of significant operational emissions, it would not contribute to significant cumulative air quality emissions impacts in combination with other projects.

Air-quality impacts associated with construction of the proposed Project would include emissions from fossil fuel-fired construction equipment and fugitive dust from

[23] New Jersey Department of Agriculture https://www.nj.gov/agriculture/divisions/anr/nrc/njerosion.html

land clearing and vehicles traveling on unpaved workspaces. Air quality impacts would generally be temporary and localized.

Construction equipment powered by diesel or gasoline engines are sources of combustion-related emissions. Texas Eastern conservatively assessed the anticipated construction emissions compared to applicable standards and found the estimated emission rates for the Project are below *de minimis* thresholds, and therefore a General Conformity determination is not required.

Construction activities on gravel roads or non-stabilized earth may cause particulate matter in the form of fugitive dust. The amount of fugitive dust generated would be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Fugitive dust impacts would be temporary and minor, and dust suppression techniques would be employed to control fugitive dust emissions during construction.

Considering the projects within 0.25 mile of the Project listed in appendix D, cumulative impacts from construction-related air emissions and fugitive dust are expected to be minimal as they would be short-term temporary impacts. Therefore, we conclude that construction of the proposed Project is not expected to significantly contribute to the cumulative impacts on air quality due to varying construction timelines for other projects and the small nature of the majority of the projects listed.

9.3 1.0-Mile Radius Geographic Scope

As listed in appendix D, projects that have the potential for contributing to cumulative impacts within 1.0 mile of the Project include:

- the Transco Interconnect Activities associated with the Middlesex Extension Project;
- the I-287 North Bridge Construction Project, Grove Avenue Bridge over Port Reading Railroad Rehabilitation Project, and Northeast Corridor Upgrades Project;
- the Sewaren-Metuchen 230kV Conversion Project; and
- the Ashley Furniture Store Expansion Project and Roosevelt Park Upgrades Project.

Land Use, Recreation, and Aesthetics

The Project crosses the Greenway at the southern extent of the Project. At the proposed Project crossing location, the Greenway is elevated above the ground for pedestrians to safely cross U.S. Route 1. The Project pipeline would be installed under the elevated section allowing for unobstructed use of the Greenway during construction. Aboveground facilities would be located north and south of the Greenway, adjacent to the Greenway property limits, in an area where existing aboveground utility structures

currently exist. Texas Eastern would coordinate with Middlesex County to provide unobstructed access to the Greenway and would obtain the necessary permits to occupy the public land.

Considering the projects within 1.0 mile of the Project listed in appendix D, cumulative impacts on recreation and aesthetics are expected to be minimal, as all but one, the Roosevelt Park Upgrades Project, do not appear to impact these land use types or their impacts are within an in-kind land use. The Roosevelt Park Upgrades Project is a small "recreational experience" improvement project for the Park. The Transco Interconnect Activities associated with the Middlesex Extension Project and the Northeast Corridor Upgrades Project are in the vicinity of the Greenway and also involve in-kind land uses. For these reasons the proposed Project would not contribute to significant cumulative impacts related to the Greenway.

No disruption to nearby recreational land use is anticipated during construction and operation of the Project; therefore, the Project would not impact these land uses and would not contribute to cumulative impacts potentially caused by other Projects.

Construction Noise

Section B.7.10 discusses the Project noise analysis and the mitigation measures to comply with applicable noise standards. The main source of noise for the Project would involve HDD construction equipment operating at the HDD entry locations. Other sources of noise would be construction equipment operating where conventional pipeline construction is proposed. Texas Eastern has proposed noise mitigation measures that would be implemented during construction, and we have also recommended additional measures to reduce Project construction noise impacts on nearby residents (see section B.7.10).

Cumulative noise impacts would only occur if multiple projects were being constructed at the same time within the geographic scope. Considering the proposed Project with other projects within a 1.0 mile radius, cumulative impacts from noise are expected however, we expect that the cumulative noise impacts from the proposed Project along with other projects with concurrent construction schedules would not be significant due to our recommendations that would minimize Project-related noise, and because other noise-producing activities from these projects would likewise be required to adhere to applicable noise standards.

C: ALTERNATIVES

In preparing this EA, we considered several alternatives to the proposed action to determine whether they would be environmentally preferable over the Project. These alternatives include the no-action alternative, pipeline route alignment alternative, and pipeline construction method alternatives. In evaluating alternatives, the following criteria are used to determine whether an alternative would be environmentally preferable:

- ability to meet the Project's stated objective;
- technical and economic feasibility and practicality; and
- whether the alternative provides a significant environmental advantage over the proposed action.

The EPA in its February 20, 2020 filing, requested an evaluation of alternatives to the proposed Project, including reasonable alternatives not within the jurisdiction of the lead agency. However, the EPA did not identify any specific alternatives to the Project that it believed warranted evaluation. Our alternatives analyses are generally driven by comments or by our identification of environmental resource impacts that may be avoided or reduced by the adoption of an alternative. Based on our evaluation of impacts in section B of this EA, the major issues of concern were construction noise and the crossing of Conrail's passenger and freight railroad lines (Northeast Corridor rail lines). Alternatives that would attempt to address these issues are included in our discussion below.

Through environmental comparison and application of our professional judgment, we considered each alternative to a point where it becomes clear if the alternative could meet the three evaluation criteria. Alternatives that do not meet the Project's objective or are not feasible are not brought forward to the next level of review (i.e., a comparison and assessment of environmental resource impacts).

Determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on applicable resources as well as an analysis of impacts on resources that are not common to the alternatives being considered. Ultimately, an alternative that results in equal or minor advantages in terms of environmental impact would not in and of itself compel us to shift the impacts to another location, potentially affecting a new set of landowners.

1.0 NO-ACTION ALTERNATIVE

Under the no-action alternative, Texas Eastern would not construct the proposed Project. If the proposed facilities were not constructed, the environmental impacts identified in this EA would be avoided. However, under the no-action alternative, Texas Eastern would not be able to meet the stated objectives of the Project, which are intended to:

- reduce the risk of natural gas supply interruption to the Woodbridge Energy Center by providing an alternative long-term, firm natural gas transportation service to CPV;
- provide CPV with access to diverse energy supply sources in order to promote stability, reliability, and the better management of price volatility;
- help to reduce regional energy costs by providing access to alternative supply during periods of constraint on the natural gas system, resulting in increased commodity price competition and reduced price volatility; and
- increase market options along the Texas Eastern system.

A Commission decision to deny the proposed action would avoid the environmental impacts addressed in this EA; however, other natural gas companies may propose to modify or construct new facilities to meet the energy needs of the CPV and the demand for reliable natural gas transportation service. Such a proposal would likely result in similar or greater environmental impacts than the proposed Project; therefore, we have dismissed this alternative as a reasonable alternative to meet the Project objectives.

2.0 ALTERNATIVE PIPELINE ALIGNMENT

In order to meet the Project objectives, any pipeline routing for the Project must originate at a location along Texas Eastern's existing Line 20 and terminate near the interconnection between Transco's Woodbridge Lateral and Mainline E. While different take-off points along Line 20 are feasible, due to the short pipeline length and the endpoint constraint, our preliminary assessment did not identify any alternative routes through the area that would substantially reduce or avoid the impacts discussed in section B of this EA, including local noise and traffic impacts. However, we did identify a potential realignment of the proposed pipeline route (incorporating several different construction methods) that would avoid crossing the Conrail Northeast Corridor passenger railroad lines.[24] This is discussed below.

2.1. Line 20 Tie-in and Line 20 Extension Alternative Alignment

We evaluated an alternative pipeline alignment to the proposed 20-inch Extension that would avoid crossing Conrail's Northeast Corridor passenger railroad lines ("Alternative Alignment"). This Alternative Alignment extends from the Alternative Line 20 Tie-in, south to the intersection of the route with Oakwood Avenue. While much of this alignment is common with the proposed 20-inch Extension alignment, the construction methods that could be used for the two routes differ; therefore, the full segment extending south to Oakwood Avenue was included in the Alternative Alignment evaluation. South of Oakwood Avenue, the routing and construction method would be common for both the proposed route and Alternative

[24] Due to the location of the existing Line 20, no realignment can avoid crossing the freight railroad lines.

Alignment discussed here. Figure 3 shows the two alignments, and table 19 presents our comparison of impacts.

Although use of an HDD was considered for the Alternative Alignment, a long HDD, extending to near Oakwood Avenue, would not be feasible given the easterly bend in the alignment; and a shorter HDD would not provide for adequate space required for the pipe pull-back string, unless the apartment complex parking lot were used as workspace for fabrication of the pull-back strings, which would be disruptive for the tenants in the nearby apartment buildings.

Given the infeasibility or impracticality of an HDD for the Alternative Alignment, a conventional bore then would be required to cross the freight railroad and a foreign pipeline which are just south of the Alternative Line 20 Tie-in, both similarly situated and crossed by the Northern HDD as part of the proposed route. A conventional bore would pose many construction challenges, both on the north side of the freight railroad, in very close proximity to the apartment complex, and on the south side, behind a school.

Workspace on the north side of the conventional bore would be limited and constrained by the driveways and parking spaces of the apartment complex. Part of the driveway and several parking spaces at the apartment complex would be required for construction workspace at this location. Given the elevation difference between the north and south sides of the freight railroad and the depth of pipe required beneath the freight railroad (minimum of 40 feet), the bore pit on the north side would be very deep and would require significant shoring to create a safe working area. Additionally, given the limited workspace, off-site spoil storage would likely be required, further increasing the construction traffic through the apartment complex, as well as the duration of construction impacts. This workspace would be in close proximity to two apartment buildings in the southern corner of the complex.

Workspace on the south side of the conventional bore would be constrained by the passenger railroad slope to the west and a local utility gas pipeline and forested wetland to the east. In addition to the freight railroad, foreign pipeline, and Line 20, the bore section would also include crossing a waterbody which runs along the south side of the freight railroad, further extending the length of the bore. The bore pit and associated construction workspace would be behind and within property owned by a school. A forested wetland is also within this school property to the east of the bore workspace. While the construction workspace for the bore could be configured to avoid the wetland to the east and the waterbody to the north, avoidance of the associated forested wetland transition area and the forested riparian zone would not be possible. Furthermore, given the drainage characteristics in this area, it is anticipated that continuous dewatering of the bore pit would be required, further increasing workspace requirements, noise and light (associated with the constant pumping), and impacts in this sensitive area, as well as requiring NJDEP water allocation permits.

Figure 3. Line 20 Tie-In and Line 20 Extension Alternative Alignment

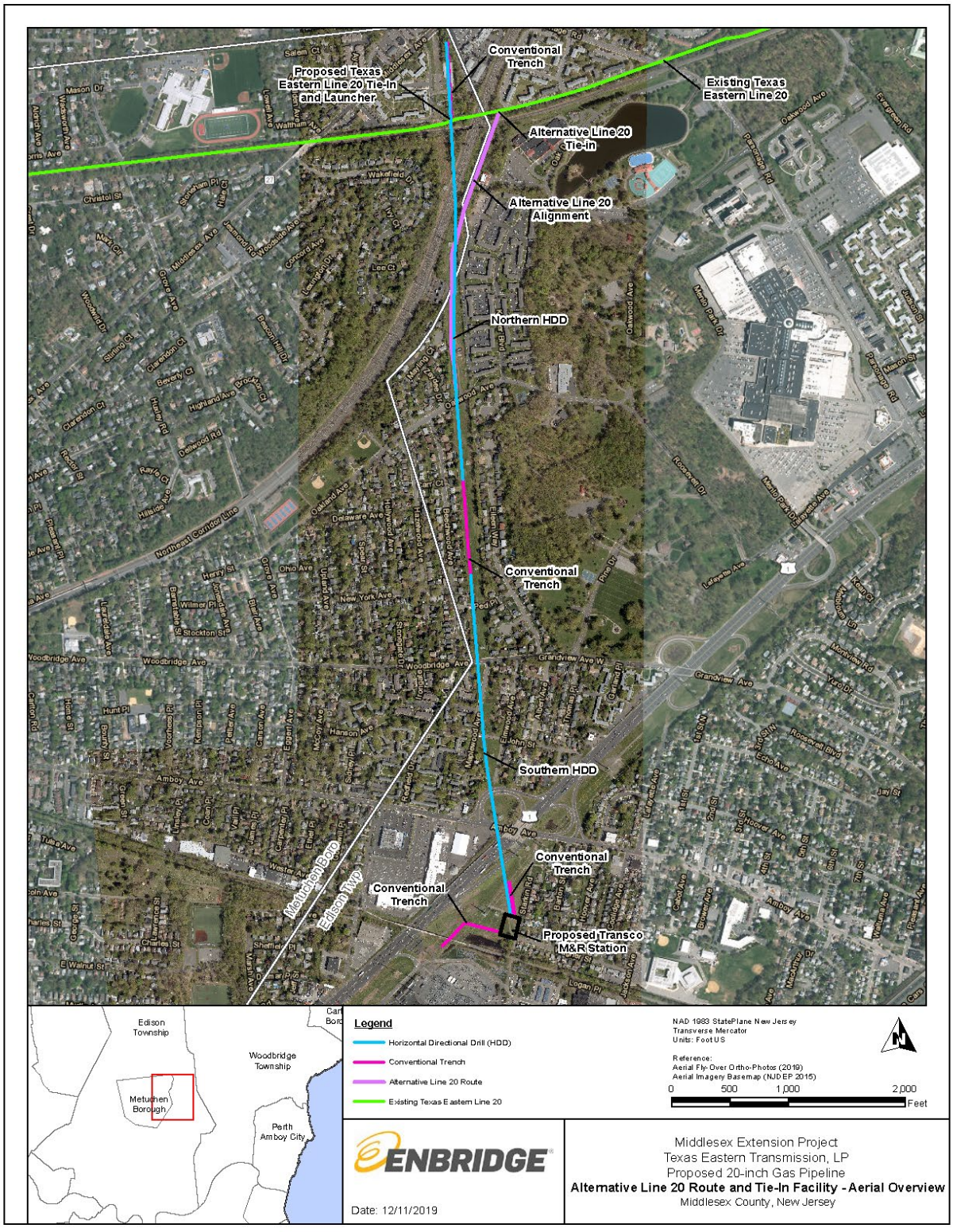


Table 19. Line 20 Tie-in Alternative Alignment Analysis			
Evaluation Criteria	**Units**	**Alternative Analysis**	
		Proposed Alignment	**Alternative Alignment**
Access Roads to Aboveground Facilities	Number	1	1
Public Road Access Points	Number	1	1
Access Road Length	Feet	632	1,310
Pipeline and Aboveground Facilities			
Pipeline Length	Miles	1.55	1.64
Construction Workspace	Acres	16.15	19.90
Operational Area	Acres	4.74	5.43
Utility Rights-of-way Co-location, Rail and Road Crossings			
Utility Corridor Collocation	Percent	100	98
Road Crossings	Number	8	8
Railroad Crossings	Number	2	1
Land Use			
Residential Construction Impact	Acres	0.80	0.55
Residences within 50 feet of Workspace	Number	47	53
Recreation / Public Lands	Number	1	1
Temporary Forest/Woodland	Acres	1.35	1.84
Permanent Forest/Woodland	Acres	0.61	0.79
Topography			
Steep Side Slope	Feet	0.00	1,200
Wetland Impacts	Total Acres		
Palustrine Forest	Acres	0.00	0.01
Palustrine Scrub-shrub	Acres	0.00	0.00
Palustrine Emergent	Acres	0.00	0.12
Waterbody Impacts			
Waterbodies Crossed	Number	3	3
Waterbodies Directly Impacted	Number	2	2

Conventional trenching installation could be used to install the pipeline from the freight railroad bore south to the exit point of the Southern HDD, located just north of Ped Place. However, additional tree clearing would be required where the pipeline parallels the passenger railroad, behind the school and adjacent to another apartment complex. Additionally, Texas Eastern states specialized construction techniques, such as drag sections, stove piping, and workspace two-toning, would likely be required to

safely install the pipeline while avoiding slope stability risks associated with the passenger railroad and electric transmission line tower. As the Alternative Alignment deviates from the passenger railroad, the pipeline would be installed along the western side of the existing local utility power corridor. This conventional lay section would abut single family residential homes, as well as the apartment complex north of Oakwood Avenue.

Based on the evaluation of impacts associated with Line 20 Tie-in Alternative Alignment, including workspace constraints and slope impacts, conventional bore feasibility, impacts on forested wetland transition area and riparian zone, and impacts on two additional landowners – a school and another apartment complex, we conclude that this alignment would not provide a significant environmental advantage to the proposed alignment.

3.0 ALTERNATIVE CONSTRUCTION METHODS

The proposed 20-inch Extension route would use the HDD trenchless pipe installation method to reduce surface impacts and avoid major rail corridors and roadways. Due in part to the noise impacts on nearby residents from the HDDs, we evaluated alternative construction methods. The alternative construction methods listed in this section describe pipe installation methods other than the proposed HDDs, as well as alternative crossing of NJDEP regulated features.

3.1. Northern HDD Alternative Pipe Installation Methods

Given Conrail's concerns regarding the proposed HDD crossing of its railroad, we evaluated alternative construction methods to cross in this area. The Northern HDD is proposed to cross both the freight railroad and passenger railroad corridors with a trenchless method so as not to interrupt rail operations. Any alternative pipe installation methods would also need to avoid operational disruption to the railroads.

A conventional bore was assessed for individual crossings of each railroad as well as a combined crossing of both railroads. Crossing each railroad individually with a conventional bore would not be feasible, given that the area between the railroads is inaccessible for large boring equipment. Additionally, with the topography and existing utilities in the area, it is unclear whether adequate workspace would be available to excavate bore pits on each side of the railroads to perform a bore of each railroad individually. Furthermore, a single bore of both railroads is beyond the feasible length for a conventional bore, would not allow for proper control of the bore to ensure adequate protection for the railroads, and could not achieve Conrail's minimum depth of cover requirement of 40 feet beneath its railroad tracks. For these reasons a conventional bore method to individually cross the freight and passenger railroad is not a feasible construction method nor is a combined conventional bore crossing of both railroads at this location.

3.2. Southern HDD Alternative Pipe Installation Methods

To reduce construction noise impacts on nearby residents, we analyzed alternative crossing methods to the Southern HDD. This HDD is proposed to cross U.S. Route 1 and municipal roadways with a trenchless method to prevent interruptions of roadway traffic, as well as to minimize direct impacts on nearby residential communities. Any alternative would also need to avoid interruptions of U.S. Route 1 traffic.

Assuming a shorter HDD is applicable to cross U.S. Route 1, the remainder of the route could be installed using conventional trench from the north side of U.S. Route 1 to just north of Ped Place where conventional trenching is currently proposed within the existing utility corridor; this is estimated to be approximately 1,500 feet. Assuming that the HDD entry location would be on the south side of U.S. Route 1, the currently proposed workspace in this area would not change. The major change would be the inclusion of temporary workspace within the entire width of the existing utility corridor to accommodate conventional trenching. The additional workspace would increase the Project earth disturbance by approximately 4 acres. Although no wetland or waterbodies were observed in this area, these earth disturbance activities would be in close proximity to residences, and would therefore result in increased noise and visual impacts. Further, as the HDD entry pad would be in the same location for the proposed and alternative installation methods, noise impacts from the HDD of U.S. Route 1 would occur regardless which construction method is chosen. For these reasons conventional trenching does not provide a significant environmental advantage to the proposed crossing method.

3.3. Middlesex Greenway Crossing Construction Method

To minimize potential impacts on the Greenway, we evaluated alternative crossing methods to the proposed conventional trenching method. The Greenway is a linear park owned and maintained by the County of Middlesex, Office of Parks and Recreation. The Greenway land parcel width is approximately 120 feet with the primary use area being a 10-footwide paved trail situated in the center of the parcel. The trail is elevated to cross over U.S. Route 1, and it is in this elevated location where the placement of the Woodbridge Lateral Tie-in Piping is proposed.

There are three primary considerations when crossing the Greenway with the proposed pipeline. First, consideration must be given to the two surface waters that exist within the Greenway along the proposed pipeline alignment. A stormwater channel is to the north of the Greenway, and an intermittent surface water is to the south of the Greenway; and second, the Greenway pipeline crossing location is congested with aboveground and belowground obstructions including:

- the elevated walkway support structures;
- aboveground structures supporting existing electric transmission lines; and

- subsurface utilities including electric distribution lines, communication lines, and natural gas pipelines.

Any proposed pipeline alignment must avoid these obstructions to safely construct and operate the Project.

Disruption of public access to the Greenway trail was also given consideration. The majority of pedestrians access the trail from public roadways and traverse the pipeline crossing location where the trail is elevated. This situation allows trail users to have unobstructed access and use of the trail during construction activities. There are however trail users that access the trail through the existing utility right-of-way where Project construction activities and aboveground facilities are proposed. Therefore, when analyzing pipeline installation methods, we considered trail access in this location to maintain access during construction.

Texas Eastern has aligned the proposed pipeline across the Greenway with these three primary considerations and we have assessed pipeline installation using the conventional trench method or the conventional bore method. Either crossing method would not change the proposed alignment. A comparison of these crossing methods is presented below:

Conventional Trench (Proposed Method)

The proposed conventional trench pipeline installation method would cross the elevated trail section of the Greenway, a stormwater channel, and an intermittent waterbody. There are several advantages to using a conventional trench method including relatively minimal workspace; short construction duration; identification of potential unknown subsurface obstructions; and soil management.

Prior to trench excavation, Texas Eastern would weld a pipestring together in sections at a length that would span the Greenway. A single trench line with small bell hole access would be excavated and the pipestring placed into the trench and backfilled. Texas Eastern would cross both the stormwater channel and intermittent waterbody with a dry crossing method during this construction. This conventional trench construction method is anticipated to have a duration of less than 48 hours.

The history of this area as an active railroad may have unknown buried structures. Use of a conventional trench would allow potential unknown obstructions to be identified and avoided. Also, the railroad history has shown that soil contamination is present along the Greenway trail, and Texas Eastern would remove and manage any contaminated soils excavated during construction (see section B.2).

Conventional Bore

Use of a conventional bore method would not have the ability to cross the entire Greenway without excavation within its boundaries nor could it identify unknown

obstructions or manage subsurface contaminated soil. Also, both waterbodies may be impacted by the excavations.

The inability to cross the entire Greenway with a conventional bore is caused by the topography within the Greenway and each waterbody bank heights and bed depths. A conventional bore requires the excavation of extensive deep pits, which would require additional disturbance on either side of the crossing to accommodate the bore equipment, bore pipe section, and tie-ins to adjacent pipe sections. The NJDEP requires that the pipeline be placed at a depth of at least 4 feet below the bed of each waterbody. Because the conventional bore method requires a near level, horizontal installation, the bottom of each bore pit would be at a depth four feet below the lowest waterbody bed, plus the additional depth needed to accommodate the bore equipment. This situation would cause the pits to be very deep, estimated to be approximately 12 feet or deeper. To lessen the pit depth, the pit would be placed at a location with a lower elevation. Lower elevations are associated with waterbody locations and would cause the pit to be placed directly adjacent to both waterbodies.

Pit placement is also constrained by existing utilities. The Woodbridge Lateral is on the south side of the Greenway. If the pit was located so that it would avoid waterbody impacts, it would have to be placed on the south side of the pipeline. Because of the elevation change from the waterbody to ground surface in the pipeline location, a deep pit would be required, and given safety requirements, the width of the pit would encompass a large area adjacent to Pierson Avenue. The pits would have to be open for an extended period of time, anticipated to require approximately 3-4 weeks. The pit location and duration could create restricted access to the Greenway by pedestrians accessing the trail from Pierson Avenue.

Texas Eastern proposes to use the conventional trench method over the conventional bore at this location as the conventional trench method would likely have less impacts to the waterbodies, provides the ability to identify unknown subsurface obstructions, minimize the time necessary to complete construction, and minimizes access restrictions to the Greenway trail from Pierson Avenue. Therefore, we conclude that the conventional bore alternative would not provide a significant environmental advantage to the proposed conventional trench method.

4.0 ALTERNATIVES CONCLUSION

We reviewed and evaluated alternatives to Texas Eastern's proposal. No pipeline route or construction alternatives were identified that would provide a significant environmental advantage over the proposed route and Project construction design. Furthermore, while we did receive comments from the EPA requesting a robust alternatives analysis, no comments from the public or agencies have been received that raised issues with this proposal that justified further evaluation of any site or construction method alternatives. Therefore, we conclude that the proposed Project, as modified by our recommendations, is the preferred alternative to meet the Project objectives.

D: STAFF'S CONCLUSIONS AND RECOMMENDATIONS

Based upon the analysis in this EA, we have determined that if Texas Eastern constructs and operates the proposed facilities in accordance with its application, supplements, and staff's recommended mitigation measures below, approval of the Project would not constitute a major federal action significantly affecting the quality of the human environment. We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions to any Certificate the Commission may issue:

1. Texas Eastern shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EA, unless modified by the Order. Texas Eastern must:
    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
    b. justify each modification relative to site-specific conditions;
    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
    d. receive approval in writing from the Director of OEP or the Director's designee **before using that modification**.

2. The Director of OEP, or the Director's designee, has delegated authority to address any requests for approvals or authorizations necessary to carry out the conditions of the Order, and take whatever steps are necessary to ensure the protection of environmental resources during construction and operation of the Project. This authority shall allow:
    a. the modification of conditions of the Order;
    b. stop-work authority; and
    c. the imposition of any additional measures deemed necessary to ensure continued compliance with the intent of the conditions of the Order as well as the avoidance or mitigation of unforeseen adverse environmental impact resulting from Project construction and operation activities.

3. **Prior to any construction**, Texas Eastern shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, Environmental Inspectors (EI), and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Texas Eastern shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   Texas Eastern' s exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Texas Eastern' s right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Texas Eastern shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP, or the Director's designee **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the Commission's Plan and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

   b. implementation of endangered, threatened, or special concern species mitigation measures;

   c. recommendations by state regulatory authorities; and

   d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction** begins, Texas Eastern shall file an Implementation Plan with the Secretary for

review and written approval by the Director of OEP, or the Director's designee. Texas Eastern must file revisions to the plan as schedules change. The plan shall identify:

a. how Texas Eastern will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EA, and required by the Order;

b. how Texas Eastern will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

c. the number of EIs assigned (per spread), and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;

e. the location and dates of the environmental compliance training and instructions Texas Eastern will give to all personnel involved with construction and restoration;

f. the company personnel (if known) and specific portion of Texas Eastern' s organization having responsibility for compliance;

g. the procedures (including use of contract penalties) Texas Eastern will follow if noncompliance occurs; and

h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. Texas Eastern shall employ at least one EI for the Project. The EI shall be:

a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

d. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and

e. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Texas Eastern shall file updated status reports with the Secretary on a **weekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

   a. an update on Texas Eastern' s efforts to obtain the necessary federal authorizations;

   b. the construction status of the Project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally-sensitive areas;

   c. a listing of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

   d. a description of the corrective actions implemented in response to all instances of noncompliance;

   e. the effectiveness of all corrective actions implemented;

   f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

   g. copies of any correspondence received by Texas Eastern from other federal, state, or local permitting agencies concerning instances of noncompliance, and Texas Eastern' s response.

9. Texas Eastern shall develop and implement an environmental complaint resolution procedure, and file such procedure with the Secretary, for review and approval by the Director of OEP or the Director's designee. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems or concerns during construction of the Project and restoration of the right-of-way. **Prior to construction**, Texas Eastern shall mail the complaint procedures to each landowner whose property is crossed by the Project and/or adjacent to the HDD entry points.

   a. In its letter to affected landowners, Texas Eastern shall:

      (1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;

(2) instruct the landowners that if they are not satisfied with the response, they should call Texas Eastern' s Hotline; the letter should indicate how soon to expect a response; and

(3) instruct the landowners that if they are still not satisfied with the response from Texas Eastern' s Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. In addition, Texas Eastern shall include in its **weekly** status report a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;

(2) the location of the affected property;

(3) a description of the problem/concern; and

(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

10. Texas Eastern must receive written authorization from the Director of OEP, or the Director's designee **before commencing construction of any Project facilities.** To obtain such authorization, Texas Eastern must file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. Texas Eastern must receive written authorization from the Director of OEP, or the Director's designee **before placing the Project into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.

12. **Within 30 days of placing the authorized facilities in service**, Texas Eastern shall file an affirmative statement with the Secretary, certified by a senior company official:

a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or

b. identifying which of the conditions in the Order Texas Eastern has complied with or will comply with. This statement shall also identify any areas affected by the project where compliance measures were not properly

implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction**, Texas Eastern shall file a commitment to restrict any tree clearing activities between April 1 and September 30, to minimize potential impacts on federally listed bat species.

14. **Prior to construction**, Texas Eastern shall file with the Secretary a copy of the determination of consistency with the Coastal Zone Management Plan issued by the NJDEP.

15. **Prior to construction of the Northern and Southern HDDs,** Texas Eastern shall file with the Secretary, for the review and written approval by the Director of OEP, or the Director's designee, an HDD noise mitigation plan to reduce the projected noise level attributable to the HDD construction at the nearest NSAs and ensure that noise levels at the HDD entry points does not exceed the mitigated predicted level of 3 dB over the ambient noise environment. **During drilling operations**, Texas Eastern shall implement the approved plan, monitor noise levels and report those findings on a **weekly basis**, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than the predicted levels at the NSAs.

16. Texas Eastern shall limit Project construction outside of the noise-mitigated HDD entry points **to the hours between 7:00 am and 7:00 pm**.

E: LIST OF PREPARERS

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B.S. Environmental Management, 2018. University of Maryland University College

Christopher Brosman – Cultural Resources
M.A. Anthropology, 2012. University of Nevada Las Vegas
B.A. Anthropology, 2005. University of Nevada Las Vegas

F: LIST OF REFERENCES

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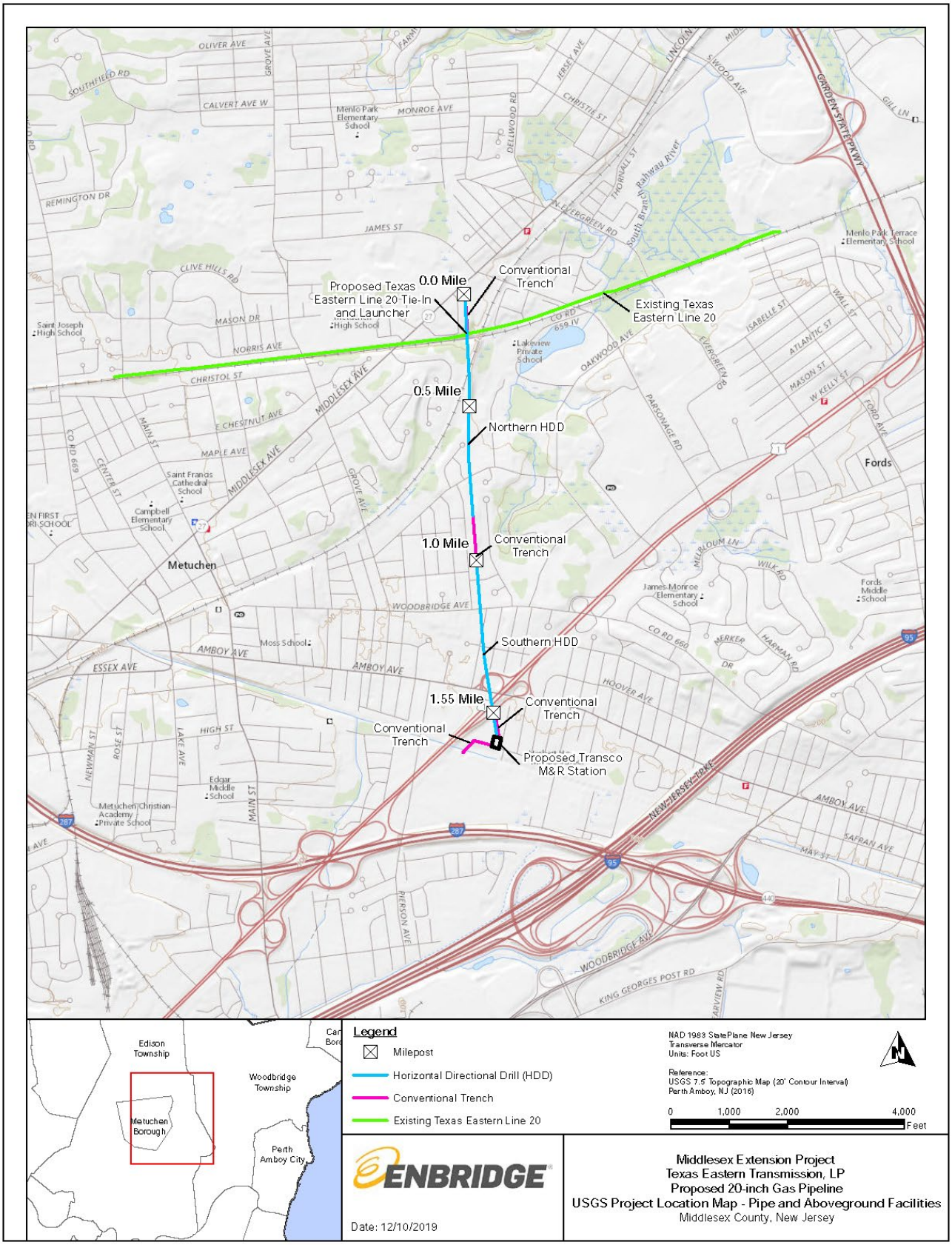
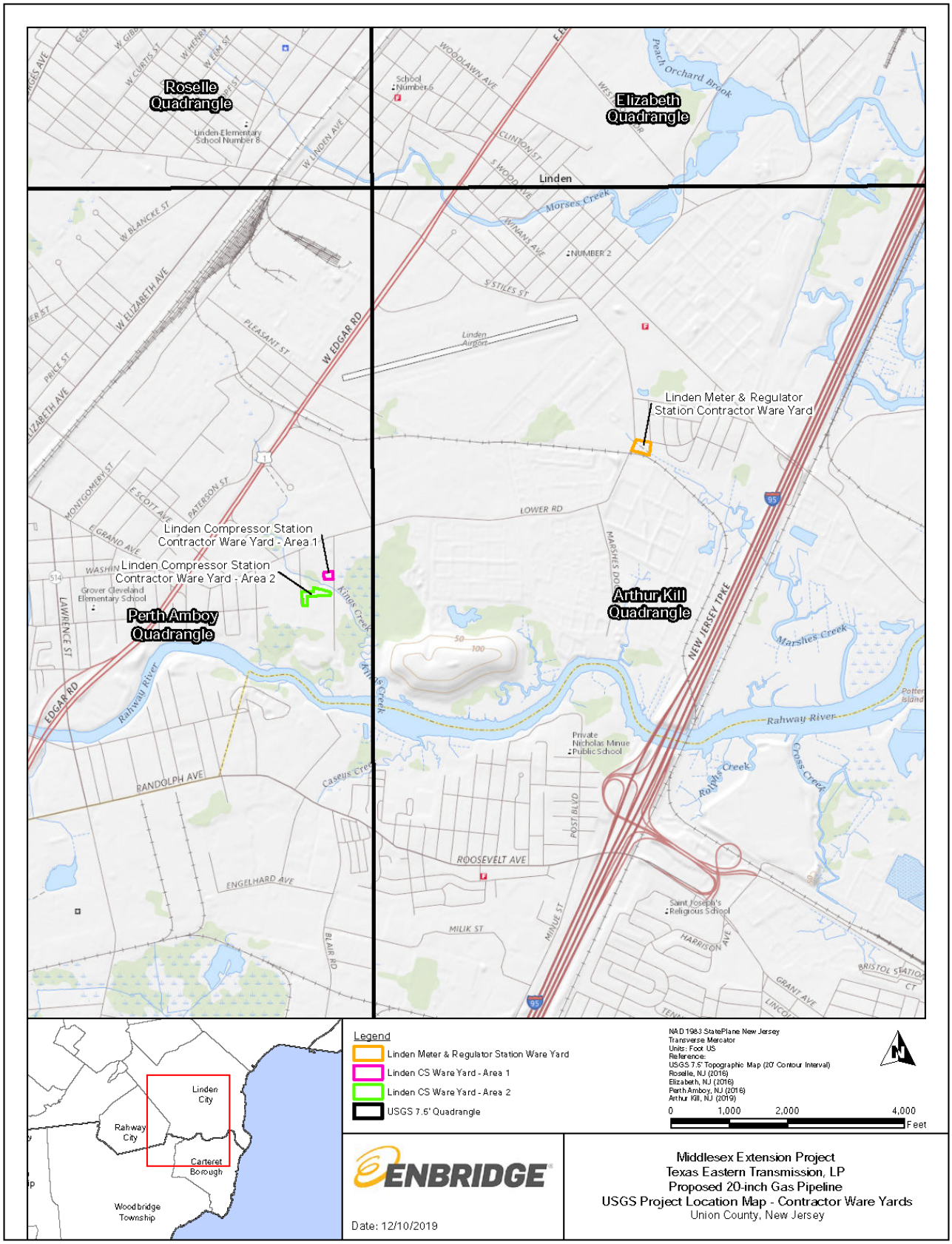
APPENDIX A

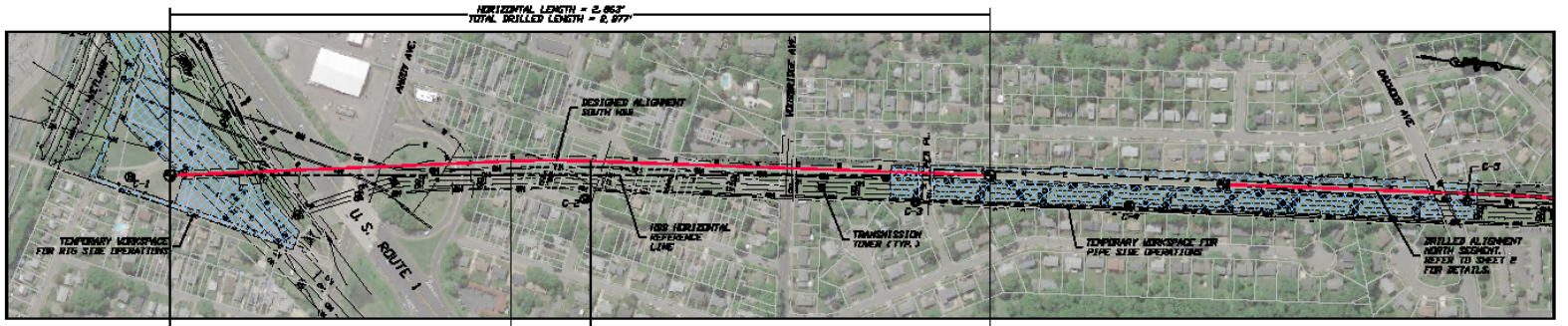
USGS Project Location Maps


0.0 Mile
Proposed Texas Eastern Line 20 Tie-In and Launcher
Conventional Trench
Existing Texas Eastern Line 20
0.5 Mile
Northern HDD
1.0 Mile
Conventional Trench
Southern HDD
1.55 Mile
Conventional Trench
Conventional Trench
Proposed Transco M&R Station
Metuchen
Fords
Menlo Park Elementary School
Menlo Park Terrace Elementary School
Saint Joseph High School
Lakeview Private School
Saint Francis Cathedral School
Campbell Elementary School
James Monroe Elementary School
Fords Middle School
Moss School
Edgar Middle School
Metuchen Christian Academy Private School
Legend
Milepost
Horizontal Directional Drill (HDD)
Conventional Trench
Existing Texas Eastern Line 20
Edison Township
Woodbridge Township
Metuchen Borough
Perth Amboy City
NAD 1983 StatePlane New Jersey Transverse Mercator
Units: Foot US
Reference:
USGS 7.5' Topographic Map (20' Contour Interval)
Perth Amboy, NJ (2016)
0
1,000
2,000
4,000
Feet
ENBRIDGE
Date: 12/10/2019
Middlesex Extension Project
Texas Eastern Transmission, LP
Proposed 20-inch Gas Pipeline
USGS Project Location Map - Pipe and Aboveground Facilities
Middlesex County, New Jersey


Roselle Quadrangle
Elizabeth Quadrangle
Linden
Linden Meter & Regulator Station Contractor Ware Yard
Linden Compressor Station Contractor Ware Yard - Area 1
Linden Compressor Station Contractor Ware Yard - Area 2
Perth Amboy Quadrangle
Arthur Kill Quadrangle
Linden City
Rahway City
Carteret Borough
Woodbridge Township
Legend
Linden Meter & Regulator Station Ware Yard
Linden CS Ware Yard - Area 1
Linden CS Ware Yard - Area 2
USGS 7.5' Quadrangle
NAD 1983 StatePlane New Jersey Transverse Mercator
Units: Foot US
Reference:
USGS 7.5' Topographic Map (20' Contour Interval)
Roselle, NJ (2016)
Elizabeth, NJ (2016)
Perth Amboy, NJ (2016)
Arthur Kill, NJ (2019)
0 1,000 2,000 4,000
Feet
ENBRIDGE
Date: 12/10/2019
Middlesex Extension Project
Texas Eastern Transmission, LP
Proposed 20-inch Gas Pipeline
USGS Project Location Map - Contractor Ware Yards
Union County, New Jersey

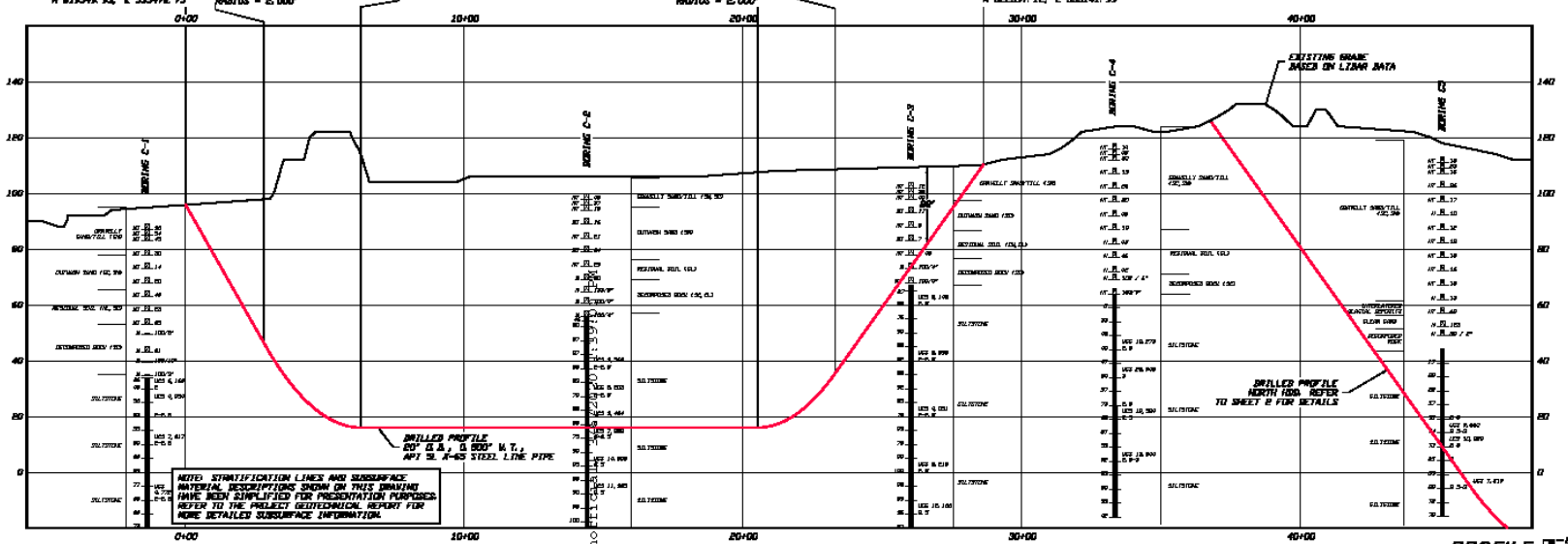
APPENDIX B

HDD Design Profiles



PLAN

SCALE: 1"=200'



PROFILE

SCALE: 1"=400' HORIZONTAL, 1"= 20' VERTICAL

GENERAL LEGEND

- DRILLED PATH ENTRY/EXIT POINT

GEOTECHNICAL LEGEND

- BORING LOCATION

SPLIT SPOON SAMPLE

- PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
- PERCENTAGE OF GRAVEL, BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

CORE BARREL SAMPLE

- UNCONFINED COMPRESSIVE STRENGTH (PSI)
- MOHS HARDNESS
- ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES:

1. DRAFT GEOTECHNICAL DATA PROVIDED BY NUESER RUTLEDGE CONSULTING ENGINEERS, NEW YORK, NY. REFER TO THE PROJECT GEOTECHNICAL DATA REPORT DATED 8/7/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
2. THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

TOPOGRAPHIC SURVEY NOTES:

1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, HOUSTON, TEXAS.
2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO NEW JERSEY STATE PLANE COORDINATES, NAD 83.
3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

DRILLED PATH NOTES:

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

PILOT HOLE TOLERANCES:

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 3 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT, UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
2. EXIT POINT: UP TO 0 FEET SHORT OR 25 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT, UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
3. ELEVATION: UP TO 3 FEET ABOVE AND 20 FEET BELOW THE DESIGNED PROFILE
4. ALIGNMENT: UP TO 8 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
5. CURVE RADIUS: NO LESS THAN 1,999 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

PROTECTION OF EXISTING FACILITIES:

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
3. MODIFY DRILLING PRACTICES AND BOREHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY

MIDDLESEX EXTENSION PROJECT

PLAN AND PROFILE
20-INCH SOUTH CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATIONS	DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
MIDDLESEX COUNTY, NEW JERSEY	11/6/19	JMS	JMS	SHOWN FOR D-SIZE PLOT	MIDDLESEX SOUTH	P4

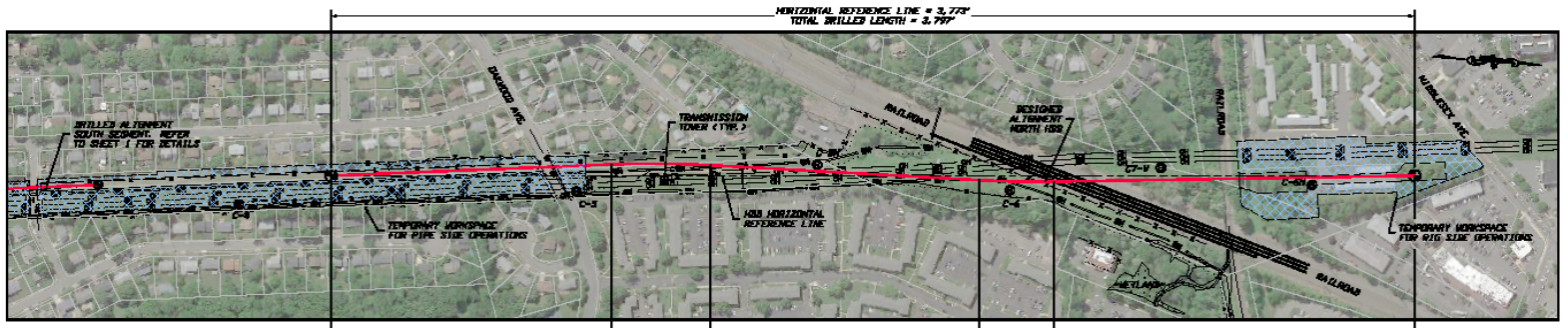
NO.	DATE	BY	CHECK	APP.
P4	2/27/20	KMW	JMS	JMS
P3	2/11/20	CDS	JMS	JMS
P2	1/7/20	KMW	DMP	JMS
P1				

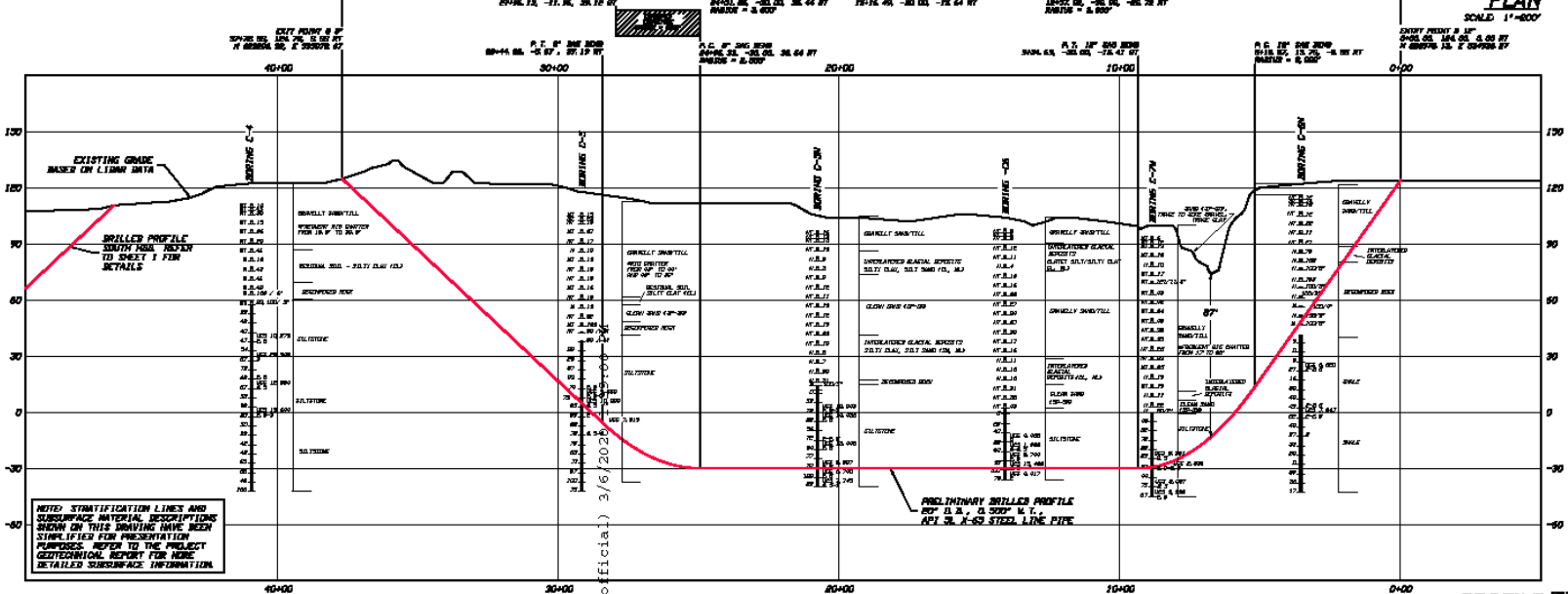
UPDATE GEOTECHNICAL DATA BASED ON FINAL REPORT
UPDATE GEOTECHNICAL LOGS
SHIFT ENTRY LOCATION NORTH
REVISION/DESCRIPTION

J.D. Hair & Associates, Inc.
Consulting Engineers
2424 East 21st Street
Suite 810
Tulsa, Oklahoma 74114

PROJECT NO.
ENBRIDGE1911

SHEET NO.
1





GENERAL LEGEND

- DRILLED PATH ENTRY/EXIT POINT

GEOTECHNICAL LEGEND

- BORING LOCATION

SPLIT SPOON SAMPLE

- 55 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
- 25 — PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

CORE BARREL SAMPLE

- UCS 6,000 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
- 55 — MOHS HARDNESS
- ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES:

1. DRAFT GEOTECHNICAL DATA PROVIDED BY MUESER RUTLEDGE CONSULTING ENGINEERS, NEW YORK, NY. REFER TO THE PROJECT GEOTECHNICAL DATA REPORT DATED 2/7/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
2. THE LETTER "M" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "MY" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

TOPOGRAPHIC SURVEY NOTES:

TOPOGRAPHIC SURVEY DATA PROVIDED BY ENDRIDGE, HOUSTON, TEXAS.

NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO NEW JERSEY STATE PLANE COORDINATES, NAD 83.

ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

DRILLER PATH NOTES:

DRILLER PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CENTERLINE ESTABLISHED FOR THE DRILLED SEGMENT.

DRILLER PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 3 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT, UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
2. EXIT POINT: UP TO 0 FEET SHORT OR 25 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
3. ELEVATION: UP TO 3 FEET ABOVE AND 80 FEET BELOW THE DESIGNED PROFILE
4. ALIGNMENT: UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
5. CURVE RADIUS: NO LESS THAN 1,333 FEET BASED ON A 3°/JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

PROTECTION OF EXISTING FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY

MIDDLESEX EXTENSION PROJECT

PLAN AND PROFILE
20-INCH NORTH CROSSING
HDD HORIZONTAL DIRECTIONAL DRILLING

LOCATION: MIDDLESEX COUNTY, NEW JERSEY
DRAWING LABEL: MIDDLESEX NORTH
DESIGNED: TERA ROVA
DRAWN: TERA ROVA
CHECKED: JMS
APPROVED: JJS
DATE: 11/12/19
SCALE: 1"=600' FOR 24"x36" PLOT
REVISION: P5

NO.	DATE	REVISION DESCRIPTION	BY	CHECK	APP.
P5	03/11/20	UPDATE GEOTECHNICAL LOGS	CDS	JMS	JMS
P4	02/28/20	REVISE ENTRY ANGLE AND DESIGN DEPTH	CDS	JMS	JMS
P3	01/07/20	REVISE ENTRY ANGLE AND DESIGN DEPTH	KMW	DMP	JMS
P2	12/09/19	REVISE ALIGNMENT, INCREASE DESIGN DEPTH	KMW	DMP	JMS

J.D. Hair & Associates, Inc.
Consulting Engineers
3434 East 21st Street
Suite 810
Tulsa, Oklahoma 74114

PROJECT NO.
ENBRIDGE\1911

SHEET NO.
2

APPENDIX C

Project Alignment Sheets

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
MIDDLESEX, NJ
2020

DATE	REV - ISSUE	APPROVALS			
		LEAD DRAFTERS	PROJECT ENGINEER	PROJECT MANAGER	PROJECT DIRECTOR
11/25/19	REV 0 - ISSUED FOR PERMITTING	DTO/MMM			
12/05/19	REV 1 - REVISED WS PER DESIGN COMMENTS	DTO/MMM			
12/20/19	REV 2 - REVISED PER J.D. HAIR HDD DESIGN	DTO/MMM			
01/10/20	REV 3 - REVISED PER J.D. HAIR HDD DESIGN	DTO/MMM			
03/12/20	REV 4 - FERC DATA REQUEST NO. 1	BK (ENE)	TI (ENE)	MDW (ENE)	
04/21/20	REV 5 - FERC SUPPLEMENTAL FILING NO. 1	BK (ENE)	TI (ENE)	MDW (ENE)	

ENBRIDGE®
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

RIGHT-OF-WAY		NJ-20B-MI-001 1,344'	
TRACT NUMBERS			
OWNERSHIP / AGENCY			
	1-10 CL SIDEWALK 1-25 EDGE OF PAVEMENT 1-25 SANITARY SEWER	1-70 OVERHEAD WIRE	3-107 CURB 4-106 P.I. LT 44° 4-146 P.I. RT 45° 5-145 P.I. RT 90°
CLASS LOCATION			
PIPE MATERIAL			

ALIGNMENT LEGEND

PROPOSED PIPELINE
POINT OF INTERSECTION P.I.
PROPOSED PIPELINE HDD
WORKSPACE LIMITS
PROPOSED PERMANENT EASEMENT
ACCESS ROAD
DELINEATED WETLAND
DELINEATED WATERBODY
METAL FENCE
RAIL FENCE
BUILDING
RAILROAD RAILS
EDGE OF GRAVEL
EDGE OF PAVEMENT
ELECTRIC LINE
GAS LINE
WATER LINE
OVERHEAD ELECTRIC LINE
SANITARY SEWER LINE
TET GAS
NATURAL GAS
FOREST EDGE
TAX MAP PARCELS (WHITE)
PARCEL ID — NJ-MI-036
UTILITY POLE
GUY POLE
GUY WIRE
BOLLARD
ELECTRIC TOWER
SQUARE CATCH BASIN
DRAIN MANHOLE
ELECTRIC MANHOLE
COMMUNICATIONS MANHOLE
SEWER MANHOLE
LIGHT POST
GAS MARKER
GAS METER
GAS VALVE
GAS VENT PIPE
HDD ENTRY/EXIT
CONCRETE BOUND
PIPE
REBAR
TEST STATION
ELECTRIC LINE MARKER
MUNICIPAL BOUNDARY

BOROUGH OF METUCHEN
MIDDLESEX COUNTY, NEW JERSEY

5 REVISIONS TO THIS DRAWING ARE SHOWN ENCIRCLED WITH A REVISION CLOUD AND TAGGED WITH A REVISION TRIANGLE.

TAR 0.2 5
WAKEFIELD DR.
NJ-MI-001.001
NJ-MI-002.001
S-HUR-004
NJ-20-MI-51R
MP 0.25
MP 0.0
20' WIDE PROPOSED PERMANENT EASEMENT
10' WIDE PROPOSED PERMANENT EASEMENT
NJ-20B-MI-001
PAR 0.0
MATCHLINE 5+92
NJ-20-MI-52
MP 0.13
60' WIDE PROPOSED PERMANENT EASEMENT
30' WIDE PROPOSED PERMANENT EASEMENT
70' WIDE PROPOSED PERMANENT EASEMENT
HDD ENTRY
NJ-MI-002
LINE 20 TIE-IN
NJ-20B-MI-001
BOROUGH OF METUCHEN
TOWNSHIP OF EDISON
NJ-20B-MI-052.001
NJ-20B-MI-052.002
MIDDLESEX AVE (NJ SR 27)
GRAPHIC SCALE: (IN FEET) 1"= 50'-0"
IMAGERY DATE APRIL 2019

ENVIRONMENTAL DATA

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT
VERTICAL DATUM: NAVD88

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 20'

FOR ABOVE GRADE SITE DETAILS SEE DWG REFERENCE NO. 1
NATURAL GROUND
4' MINIMUM COVER
PROPOSED 20" PIPELINE

SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY 04-21-20

DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	DATE
		5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
5	LAMT-LIND 20 - SHEET ID 26	4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION	3	DTO	MMW	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2	2	DTO	MMW	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3	1	DTO	MMW	REVISED WS PER DESIGN COMMENTS	12-05-19
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN	0	DTO	MMW	ISSUED FOR PERMITTING	11-25-19

REFERENCE DRAWINGS | REVISIONS

ITEM NO.	DESCRIPTION	LN. FT.

MATERIALS

TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	ENGINEERING APPROVALS			
SER - D.OAKES	BID		CONSTRUCTION	

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

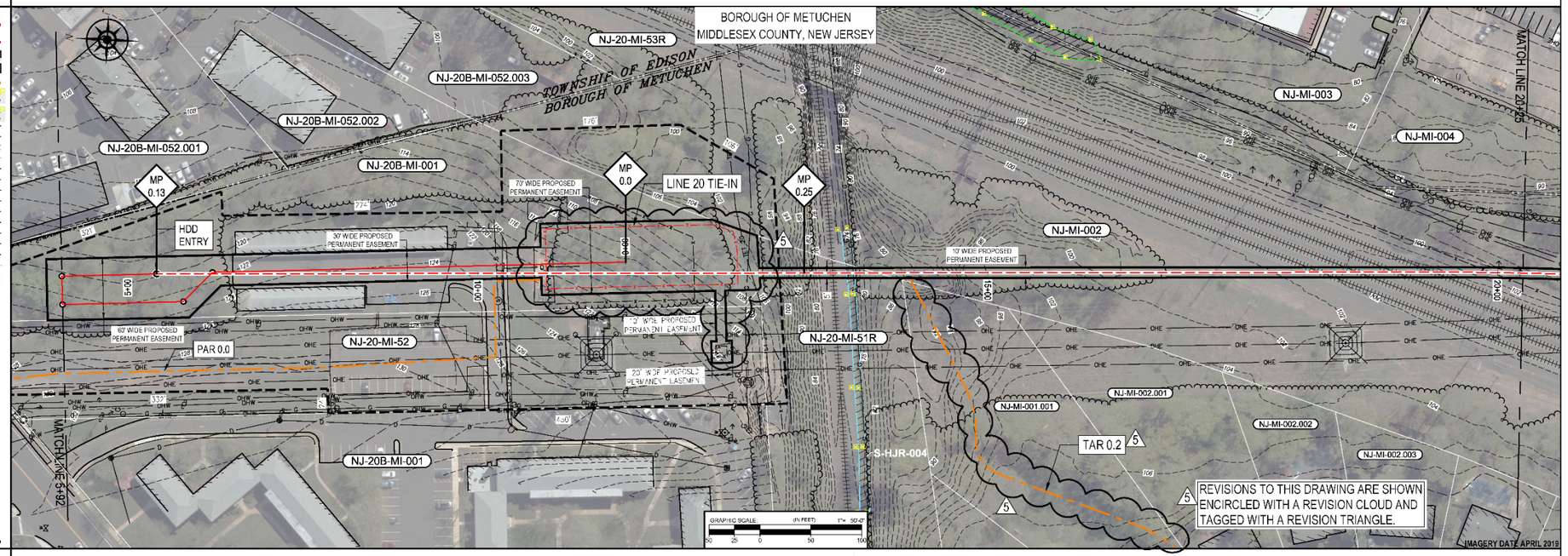
YEAR: 2021 | W.B.S. CE.000171.001 | SCALE: 1" = 50' | SHEET 1 OF 8 | REV. 5

2021-04-21 16:26:00 Official: 4/21/2021 2:44:03 PM

RIGHT-OF-WAY	NJ-20B-MI-001 1,344'	NJ-20-MI-51R 116'	NJ-MI-002 1,238'
TRACT NUMBERS			
OWNERSHIP / AGENCY			
	5+83 P.I. RT 90° · 6+85 HDD ENTRY · 7+09 CURB · 10+24 SANITARY SEWER · 10+37 TEMPORARY WORKSPACE · 10+51 CLOVERLEAF · 12+12 CHAIN LINK FENCE · 12+56 18" HPPP BUCKEYE · 12+66 30" TETCO LINE 20 PIPELINE · 13+43 CL RAILROAD · 13+61 ENTER WATERBODY · 13+67 EXIT WATERBODY · 18+05 UTILITY POLE LEFT 66' · 18+17 RAILROAD CL · 18+64 RAILROAD CL · 19+00 RAILROAD CL · 19+38 RAILROAD CL · 19+43 P.I. · 19+63 UTILITY POLE LEFT 45' · 19+94 CHAINLINK FENCE		
CLASS LOCATION			
PIPE MATERIAL			

ALIGNMENT LEGEND

PROPOSED PIPELINE · POINT OF INTERSECTION P.I. · PROPOSED PIPELINE HDD · WORKSPACE LIMITS · PROPOSED PERMANENT EASEMENT · ACCESS ROAD · DELINEATED WETLAND · DELINEATED WATERBODY · METAL FENCE · RAIL FENCE · BUILDING · RAILROAD RAILS · EDGE OF GRAVEL · EDGE OF PAVEMENT · ELECTRIC LINE · GAS LINE · WATER LINE · OVERHEAD ELECTRIC LINE · SANITARY SEWER LINE · TET GAS · NATURAL GAS · FOREST EDGE · TAX MAP PARCELS (WHITE) · PARCEL ID NJ-MI-036 · UTILITY POLE · GUY POLE · GUY WIRE · BOLLARD · ELECTRIC TOWER · SQUARE CATCH BASIN · DRAIN MANHOLE · ELECTRIC MANHOLE · COMMUNICATIONS MANHOLE · SEWER MANHOLE · LIGHT POST · GAS MARKER · GAS METER · GAS VALVE · GAS VENT PIPE · HDD ENTRY/EXIT · CONCRETE BOUND · PIPE · REBAR · TEST STATION · ELECTRIC LINE MARKER · MUNICIPAL BOUNDARY



ENVIRONMENTAL DATA

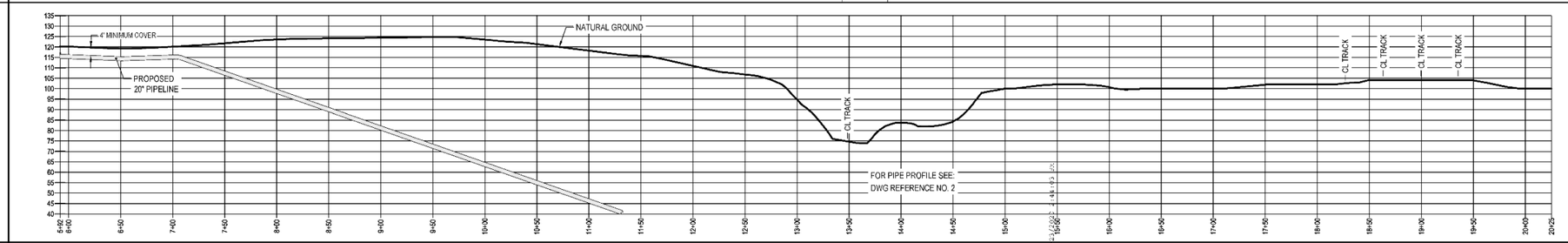
S-HJR-004 13+61 · 13+67

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT

VERTICAL DATUM: NAVD88

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 20'



SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY 04-21-20

DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	DATE
		5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
5	LAMT-LIND 20 - SHEET ID 26	4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION	3	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2	2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3	1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN	0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19
REFERENCE DRAWINGS		REVISIONS				

ITEM NO.	DESCRIPTION	LN. FT.
MATERIALS		

		ENGINEERING APPROVALS			
DRAWN BY:		BID		CONSTRUCTION	
SER - D.OAKES					
TITLE	SIGNATURE	DATE	SIGNATURE	DATE	

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2021 | W.B.S. CE.000171.001 | SCALE: 1" = 50' | SHEET 2 OF 8 | REV. 5

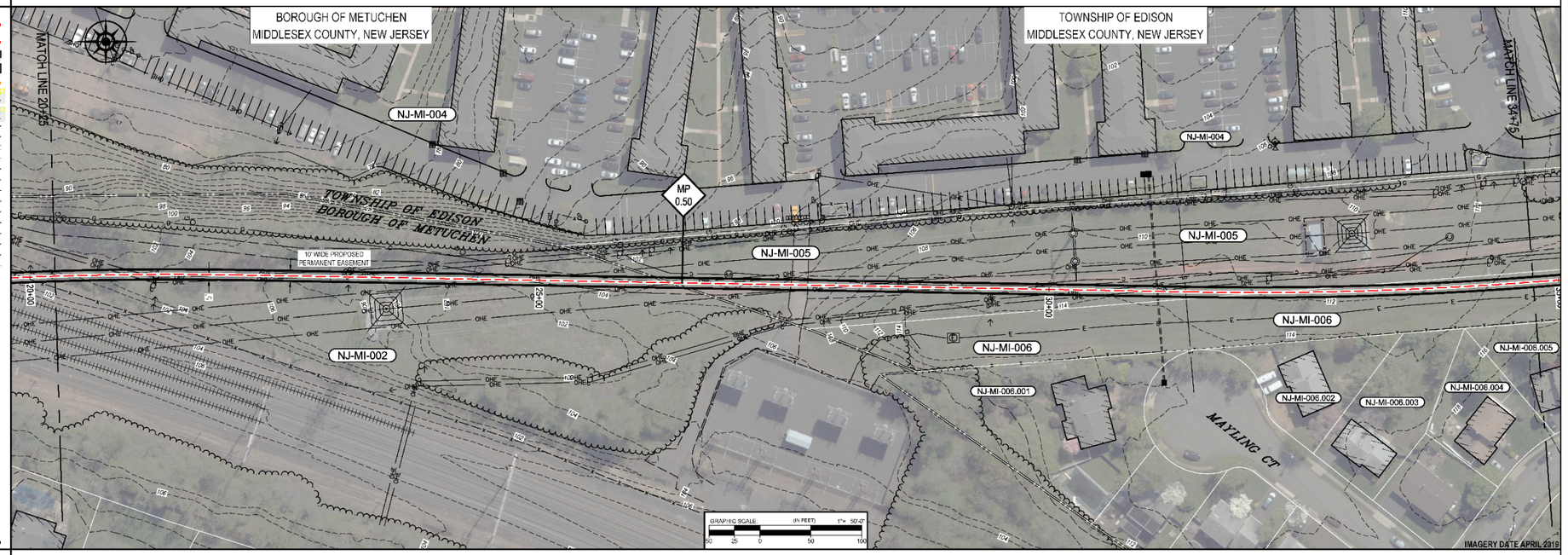
RIGHT-OF-WAY	NJ-MI-002	NJ-MI-005	NJ-MI-006
TRACT NUMBERS	1,236'	589'	458'
OWNERSHIP / AGENCY			

20+94 OVERHEAD ELECTRIC
21+13 OVERHEAD ELECTRIC
21+33 UTILITY POLE RIGHT 7'
22+00 OVERHEAD ELECTRIC
22+09 P.I.
23+48 OVERHEAD ELECTRIC
25+50 TRANSMISSION TOWER RIGHT 65'
26+74 UTILITY POLE RIGHT 18'
26+74 OVERHEAD ELECTRIC
25+28 MUNICIPAL BOUNDARY
26+41 OVERHEAD ELECTRIC
25+96 COMMUNICATIONS MANHOLE LEFT 3'
27+47 EDGE OF PAVEMENT
27+64 EDGE OF PAVEMENT
28+98 OVERHEAD ELECTRIC
29+42 UTILITY POLE RIGHT 14'
30+52 TRANSMISSION TOWER LEFT 28'
30+66 OVERHEAD ELECTRIC
31+07 OVERHEAD ELECTRIC
31+06 15" STORM SEWER
31+58 SANITARY SEWER MANHOLE
32+16 UTILITY POLE LEFT 24'
32+99 TRANSMISSION TOWER LEFT 57'
33+95 COMMUNICATION MANHOLE LEFT 49'

CLASS LOCATION	
PIPE MATERIAL	

ALIGNMENT LEGEND

- PROPOSED PIPELINE
- POINT OF INTERSECTION P.I.
- PROPOSED PIPELINE HDD
- WORKSPACE LIMITS
- PROPOSED PERMANENT EASEMENT
- ACCESS ROAD
- DELINEATED WETLAND
- DELINEATED WATERBODY
- METAL FENCE
- RAIL FENCE
- BUILDING
- RAILROAD RAILS
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- ELECTRIC LINE
- GAS LINE
- WATER LINE
- OVERHEAD ELECTRIC LINE
- SANITARY SEWER LINE
- TET GAS
- NATURAL GAS
- FOREST EDGE
- TAX MAP PARCELS (WHITE)
- PARCEL ID — NJ-MI-036
- UTILITY POLE
- GUY POLE
- GUY WIRE
- BOLLARD
- ELECTRIC TOWER
- SQUARE CATCH BASIN
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- COMMUNICATIONS MANHOLE
- SEWER MANHOLE
- LIGHT POST
- GAS MARKER
- GAS METER
- GAS VALVE
- GAS VENT PIPE
- HDD ENTRY/EXIT
- CONCRETE BOUND
- PIPE
- REBAR
- TEST STATION
- ELECTRIC LINE MARKER
- MUNICIPAL BOUNDARY



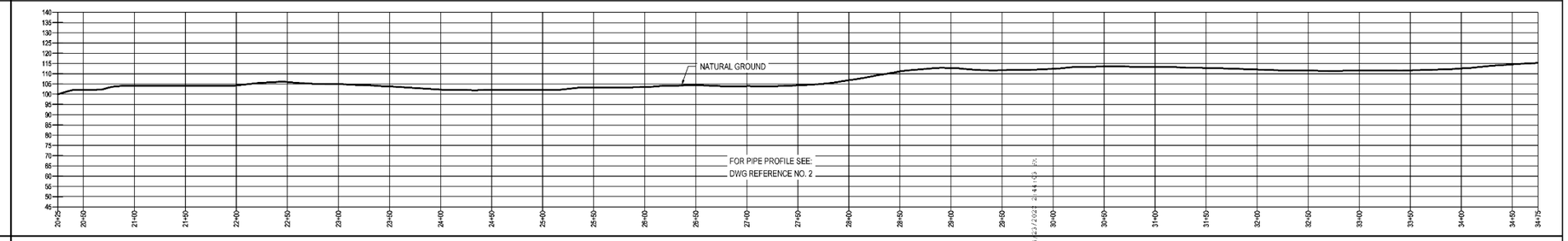
ENVIRONMENTAL DATA	

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT

VERTICAL DATUM: NAVD88

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'



SITE SPECIFIC E & S	

FOR PERMITTING PURPOSES ONLY
04-21-20

DWG. NO.	DESCRIPTION
5	LAMT-LIND 20 - SHEET ID 26
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN

REFERENCE DRAWINGS

REV	DSN	CK	DESCRIPTION	DATE
5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
3	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19

REVISIONS

ITEM NO.	DESCRIPTION	LN. FT.

MATERIALS

DRAWN BY:	ENGINEERING APPROVALS				
SER - D.OAKES	BID		CONSTRUCTION		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE	

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2021	W.B.S. CE.000171.001	SCALE: 1" = 50'	SHEET 3 OF 8	REV. 5

RIGHT-OF-WAY	NJ-MI-006	NJ-MI-007H	NJ-MI-009
TRACT NUMBERS	458'	68'	1,769'
OWNERSHIP / AGENCY			

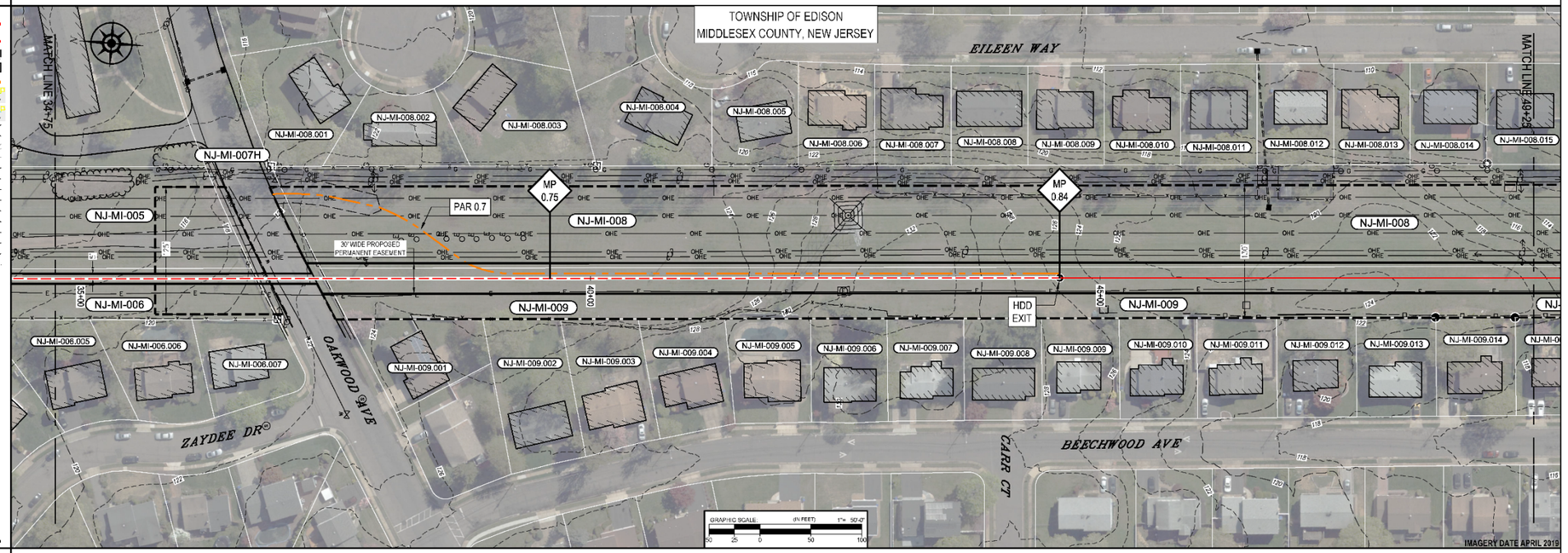
34+75 P.T. | 36+72 EDGE OF ROAD | 36+77 FENCE CROSSING | 36+81 OVERHEAD WIRE | 36+84 FENCE LINE | 36+90 WATER LINE | 37+39 EDGE OF ROAD | 37+49 RAIL FENCE | 37+91 UTILITY POLE LEFT 23' | 40+79 UTILITY POLE LEFT 23' | 42+43 TRANSMISSION TOWER LEFT 61' | 43+47 UTILITY POLE LEFT 23' | 44+49 HDD EXIT | 46+43 UTILITY POLE LEFT 24' | 48+37 UTILITY POLE LEFT 24'

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT LEGEND

PROPOSED PIPELINE — POINT OF INTERSECTION P.I.
PROPOSED PIPELINE HDD
WORKSPACE LIMITS
PROPOSED PERMANENT EASEMENT
ACCESS ROAD
DELINEATED WETLAND
DELINEATED WATERBODY
METAL FENCE
RAIL FENCE
BUILDING
RAILROAD RAILS
EDGE OF GRAVEL
EDGE OF PAVEMENT
ELECTRIC LINE
GAS LINE
WATER LINE
OVERHEAD ELECTRIC LINE
SANITARY SEWER LINE
TET GAS
NATURAL GAS
FOREST EDGE
TAX MAP PARCELS (WHITE) — PARCEL ID NJ-MI-036
UTILITY POLE
GUY POLE
GUY WIRE
BOLLARD
ELECTRIC TOWER
SQUARE CATCH BASIN
DRAIN MANHOLE
ELECTRIC MANHOLE
COMMUNICATIONS MANHOLE
SEWER MANHOLE
LIGHT POST
GAS MARKER
GAS METER
GAS VALVE
GAS VENT PIPE
HDD ENTRY/EXIT
CONCRETE BOUND
PIPE
REBAR
TEST STATION
ELECTRIC LINE MARKER
MUNICIPAL BOUNDARY

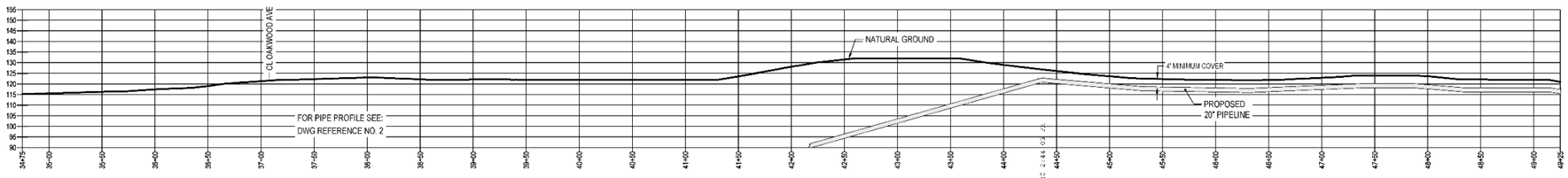


ENVIRONMENTAL DATA

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT
VERTICAL DATUM: NAVD88

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 20'



SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY 04-21-20

DWG. NO.	DESCRIPTION
5	LAMT-LIND 20 - SHEET ID 26
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN
	REFERENCE DRAWINGS

REV	DSN	CK	DESCRIPTION	DATE
5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
3	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19
			REVISIONS	

ITEM NO.	DESCRIPTION	LN. FT.
	MATERIALS	

DRAWN BY: SER - D.OAKES

ENGINEERING APPROVALS				
	BID		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2021	W.B.S. CE.000171.001	SCALE: 1" = 50'	SHEET 4 OF 8	REV. 5

RIGHT-OF-WAY	NJ-MI-009	NJ-MI-010H	NJ-MI-012	NJ-MI-013H	NJ-MI-014	NJ-MI-016H
TRACT NUMBERS	1,799'	50'	431'	56'	240'	165'
OWNERSHIP / AGENCY						

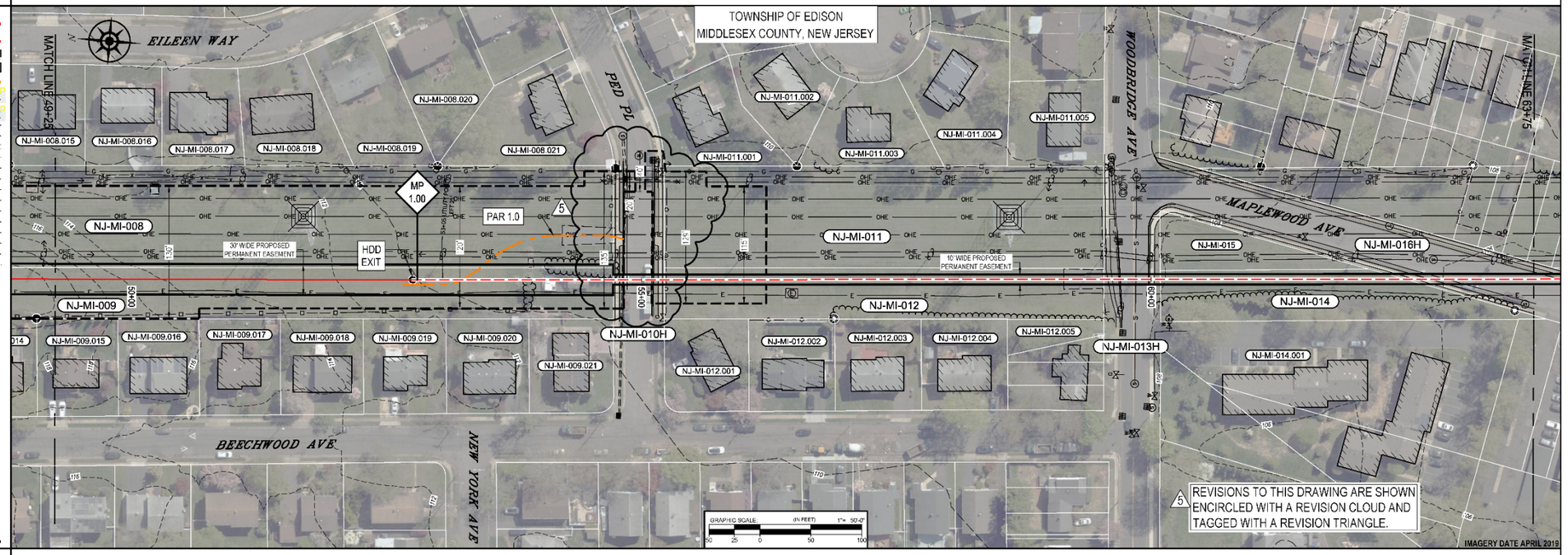
51+93 UTILITY POLE LEFT 25'
51+98 TRANSMISSION TOWER LEFT 63'
52+76 HDD EXIT
54+77 CL SIDEWALK
54+82 CL WOODBRIDGE AVE
54+88 EDGE OF PAVEMENT
54+93 WATERLINE
59+11 EDGE OF PAVEMENT
59+13 CL SIDEWALK
59+15 BAX FENCE
55+99 UTILITY POLE LEFT 24'
57+04 UTILITY POLE LEFT 25'
58+61 TRANSMISSION TOWER LEFT 63'
59+54 UTILITY POLE LEFT 25'
59+60 CL SIDEWALK
59+65 OVERHEAD ELECTRIC
59+67 EDGE OF PAVEMENT
59+85 SANITARY SEWER
59+97 EDGE OF PAVEMENT
60+03 CL SIDEWALK
61+99 UTILITY POLE LEFT 25'
63+07 CL SIDEWALK
63+19 EDGE OF PAVEMENT
63+31 UTILITY POLE LEFT 25'

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT LEGEND

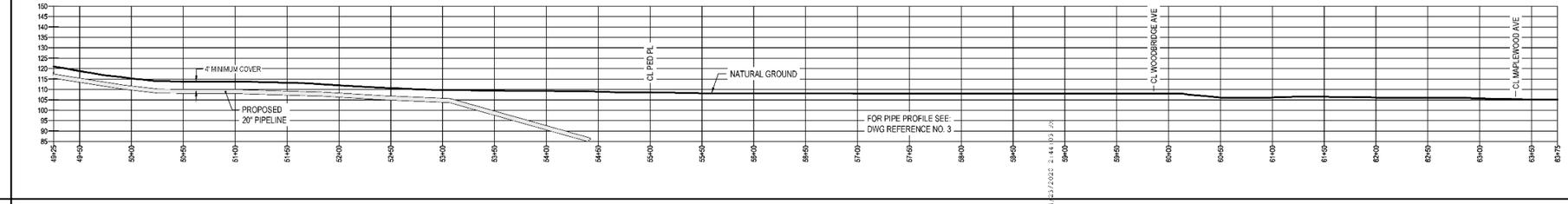
PROPOSED PIPELINE — POINT OF INTERSECTION P.I.
PROPOSED PIPELINE HDD
WORKSPACE LIMITS
PROPOSED PERMANENT EASEMENT
ACCESS ROAD
DELINEATED WETLAND
DELINEATED WATERBODY
METAL FENCE
RAIL FENCE
BUILDING
RAILROAD RAILS
EDGE OF GRAVEL
EDGE OF PAVEMENT
ELECTRIC LINE
GAS LINE
WATER LINE
OVERHEAD ELECTRIC LINE
SANITARY SEWER LINE
TET GAS
NATURAL GAS
FOREST EDGE
TAX MAP PARCELS (WHITE) — NJ-MI-036
PARCEL ID
UTILITY POLE
GUY POLE
GUY WIRE
BOLLARD
ELECTRIC TOWER
SQUARE CATCH BASIN
DRAIN MANHOLE
ELECTRIC MANHOLE
COMMUNICATIONS MANHOLE
SEWER MANHOLE
LIGHT POST
GAS MARKER
GAS METER
GAS VALVE
GAS VENT PIPE
HDD ENTRY/EXIT
CONCRETE BOUND
PIPE
REBAR
TEST STATION
ELECTRIC LINE MARKER
MUNICIPAL BOUNDARY



ENVIRONMENTAL DATA

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT
VERTICAL DATUM: NAVD88



SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY
04-21-20

DWG. NO.	DESCRIPTION
5	LAMT-LIND 20 - SHEET ID 26
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION
3	J.D HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN
0	

REFERENCE DRAWINGS

REV	DSN	CK	DESCRIPTION	DATE
5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
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2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19

REVISIONS

ITEM NO.	DESCRIPTION	LN. FT.

MATERIALS

TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY: SER - D.OAKES				

ENGINEERING APPROVALS — BID / CONSTRUCTION

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2021 | W.B.S. CE.000171.001 | SCALE: 1" = 50' | SHEET 5 OF 8 | REV. 5

RIGHT-OF-WAY	NJ-MI-016H	NJ-MI-021	NJ-MI-023H	NJ-MI-025	NJ-MI-027	NJ-MI-029	NJ-MI-030	NJ-MI-034H	NJ-MI-033H	NJ-MI-039	NJ-MI-036
TRACT NUMBERS	165'	163'	52'	147'	221'	53'	5'	385'	301'	11'	300'
OWNERSHIP / AGENCY											

64+00 EDGE OF PAVEMENT
64+43 CL SIDEWALK
64+92 UTILITY POLE LEFT 2.2'
65+88 SEWER MANHOLE RIGHT 48'
66+12 EDGE OF PAVEMENT
66+23 SANITARY SEWER
66+43 EDGE OF PAVEMENT
66+43 UTILITY POLE LEFT 19'
66+72 P.C.
67+49 UTILITY POLE LEFT 21'
68+11 TRANSMISSION TOWER LEFT 111'
68+43 GAS LINE
69+14 UTILITY POLE LEFT 24'
69+50 P.T.
70+04 UTILITY POLE LEFT 23'
70+66 UNDERGROUND ELECTRIC
70+66 CURB
EDGE OF PAVEMENT
71+25 CENTER OF MEDIAN
71+53 CURB
EDGE OF PAVEMENT
71+57 UNDERGROUND ELECTRIC
71+66 GASLINE
72+17 UTILITY POLE LEFT 21'
72+90 UNDERGROUND ELECTRIC
73+57 TRANSMISSION TOWER LEFT 111'
73+69 OVERHEAD ELECTRIC
73+94 OVERHEAD ELECTRIC
73+93 EDGE OF PAVEMENT
74+48 COMMUNICATION MANHOLE
74+58 EDGE OF PAVEMENT
74+68 CL SIDEWALK
74+74 UTILITY POLE LEFT 18'
74+86 RETAINING WALL
75+39 RETAINING WALL
75+64 OVERHEAD ELECTRIC
75+77 OVERHEAD ELECTRIC
76+14 EDGE OF PAVEMENT
76+24 UNDERGROUND ELECTRIC
76+44 UNDERGROUND ELECTRIC
76+64 OVERHEAD ELECTRIC
77+39 UNDERGROUND
77+44 EDGE OF PAVEMENT
77+65 GASOLINE
77+74 GUARDRAIL
77+84 EASEMENT
77+94 UNMARKED LINE
77+98 OVERHEAD ELECTRIC
78+43 OVERHEAD ELECTRIC

CLASS LOCATION	
PIPE MATERIAL	

ALIGNMENT LEGEND

PROPOSED PIPELINE
POINT OF INTERSECTION P.I.
PROPOSED PIPELINE HDD
WORKSPACE LIMITS
PROPOSED PERMANENT EASEMENT
ACCESS ROAD
DELINEATED WETLAND
DELINEATED WATERBODY
METAL FENCE
RAIL FENCE
BUILDING
RAILROAD RAILS
EDGE OF GRAVEL
EDGE OF PAVEMENT
ELECTRIC LINE
GAS LINE
WATER LINE
OVERHEAD ELECTRIC LINE
SANITARY SEWER LINE
TET GAS
NATURAL GAS
FOREST EDGE
TAX MAP PARCELS (WHITE)
PARCEL ID — NJ-MI-036
UTILITY POLE
GUY POLE
GUY WIRE
BOLLARD
ELECTRIC TOWER
SQUARE CATCH BASIN
DRAIN MANHOLE
ELECTRIC MANHOLE
COMMUNICATIONS MANHOLE
SEWER MANHOLE
LIGHT POST
GAS MARKER
GAS METER
GAS VALVE
GAS VENT PIPE
HDD ENTRY/EXIT
CONCRETE BOUND
PIPE
REBAR
TEST STATION
ELECTRIC LINE MARKER
MUNICIPAL BOUNDARY

TOWNSHIP OF EDISON
MIDDLESEX COUNTY, NEW JERSEY

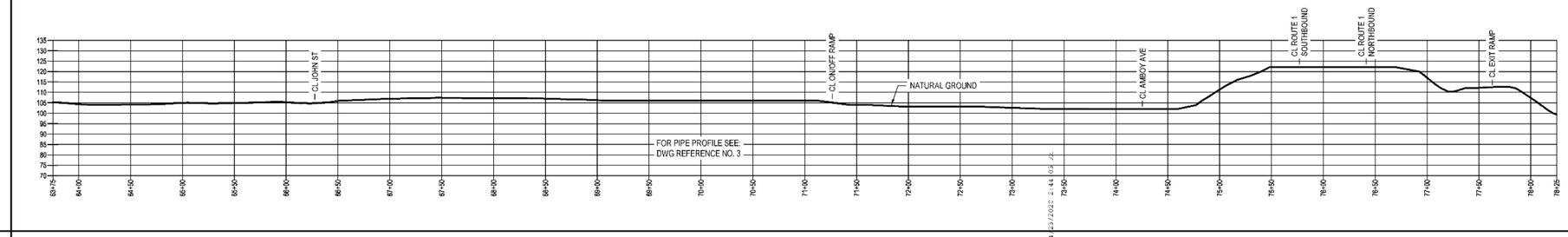
MATCH LINE 63+75
MATCH LINE 78+25
JOHN ST
ELMWOOD AVE
MAPLEWOOD AVE
AMBOY AVE
US ROUTE 1
MP 1.25
NJ-MI-016H
NJ-MI-019
NJ-MI-021
NJ-MI-022
NJ-MI-024
NJ-MI-025
NJ-MI-026
NJ-MI-027
NJ-MI-028
NJ-MI-028H
NJ-MI-029
NJ-MI-030
NJ-MI-031H
NJ-MI-033H
NJ-MI-034H
NJ-MI-036
50'-00
70'-00
75'-00
10' WIDE PROPOSED PERMANENT EASEMENT
GRAPHIC SCALE: (IN FEET) 1"= 50'-0"
IMAGERY DATE APRIL 2019

ENVIRONMENTAL DATA

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT
VERTICAL DATUM: NAVD88

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 20'



SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY
04-21-20

DWG. NO.	DESCRIPTION
5	LAMT-LIND 20 - SHEET ID 26
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN

REFERENCE DRAWINGS

REV	DSN	CK	DESCRIPTION	DATE
5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
3	DTO	MMW	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
2	DTO	MMW	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
1	DTO	MMW	REVISED WS PER DESIGN COMMENTS	12-05-19
0	DTO	MMW	ISSUED FOR PERMITTING	11-25-19

REVISIONS

ITEM NO.	DESCRIPTION	LN. FT.

MATERIALS

TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY: SER - D.OAKES				

ENGINEERING APPROVALS — BID / CONSTRUCTION

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" GAS PIPELINE
ALIGNMENT SHEET
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

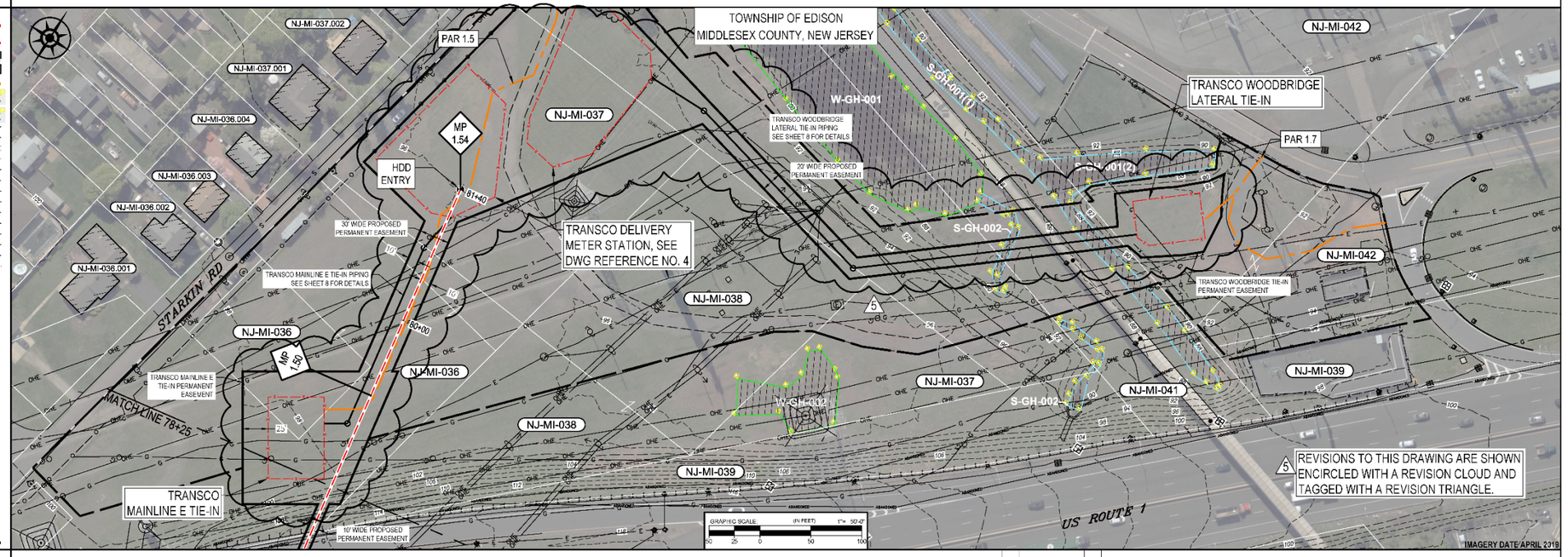
YEAR: 2021 | W.B.S. CE.000171.001 | SCALE: 1" = 50' | SHEET 6 OF 8 | REV. 5

RIGHT-OF-WAY						
TRACT NUMBERS	NJ-MI-036 300'	NJ-MI-037 298'	NJ-MI-040 239'	NJ-MI-037 NJ-MI-037	NJ-MI-040	NJ-MI-041	NJ-MI-042
OWNERSHIP / AGENCY							
CLASS LOCATION							
PIPE MATERIAL							

78+25 OVERHEAD ELECTRIC
78+25 UNDERGROUND ELECTRIC
78+45 GASLINE
78+49 GASLINE
79+44 OVERHEAD ELECTRIC
79+96 OVERHEAD ELECTRIC
79+97 GASLINE
80+11 UNDERGROUND TELECOMMUNICATION
80+53 OVERHEAD ELECTRIC
80+54 COMMUNICATION
80+84 OVERHEAD ELECTRIC
81+49 HDD ENTRY/ TRANSCO R&M#

ALIGNMENT LEGEND

PROPOSED PIPELINE
POINT OF INTERSECTION P.I.
PROPOSED PIPELINE HDD
WORKSPACE LIMITS
PROPOSED PERMANENT EASEMENT
ACCESS ROAD
DELINEATED WETLAND
DELINEATED WATERBODY
METAL FENCE
RAIL FENCE
BUILDING
RAILROAD RAILS
EDGE OF GRAVEL
EDGE OF PAVEMENT
ELECTRIC LINE
GAS LINE
WATER LINE
OVERHEAD ELECTRIC LINE
SANITARY SEWER LINE
TET GAS
NATURAL GAS
FOREST EDGE
TAX MAP PARCELS (WHITE)
PARCEL ID — NJ-MI-036
UTILITY POLE
GUY POLE
GUY WIRE
BOLLARD
ELECTRIC TOWER
SQUARE CATCH BASIN
DRAIN MANHOLE
ELECTRIC MANHOLE
COMMUNICATIONS MANHOLE
SEWER MANHOLE
LIGHT POST
GAS MARKER
GAS METER
GAS VALVE
GAS VENT PIPE
HDD ENTRY/EXIT
CONCRETE BOUND
PIPE
REBAR
TEST STATION
ELECTRIC LINE MARKER
MUNICIPAL BOUNDARY

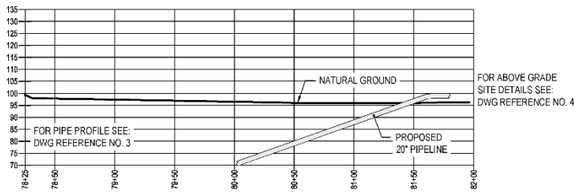


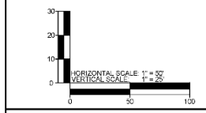
5 REVISIONS TO THIS DRAWING ARE SHOWN ENCIRCLED WITH A REVISION CLOUD AND TAGGED WITH A REVISION TRIANGLE.

ENVIRONMENTAL DATA	S-GH-002	S-GH-001

PROFILE

COORDINATE SYSTEM: NAD83 NEW JERSEY STATE PLANES, US FOOT
VERTICAL DATUM: NAVD88





SITE SPECIFIC E & S

FOR PERMITTING PURPOSES ONLY
04-21-20

DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	DATE
	REFERENCE DRAWINGS				REVISIONS	
5	LAMT-LIND 20 - SHEET ID 26	5	BK	MDW	FERC SUPPLEMENTAL FILING NO. 1	04-21-20
4	LIND-G-1002 - MEP TRANSCO DELIVERY METER STATION	4	BK	MDW	FERC DATA REQUEST NO. 1	03-12-20
3	J.D. HAIR - MIDDLESEX 20-INCH SOUTH CROSSING REV P2	3	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	01-10-20
2	J.D. HAIR - MIDDLESEX 20-INCH NORTH CROSSING REV P3	2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN	1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
		0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19

ITEM NO.	DESCRIPTION	LN. FT.
	MATERIALS	

DRAWN BY:	ENGINEERING APPROVALS				
	BID		CONSTRUCTION		
SER - D.OAKES					
TITLE	SIGNATURE	DATE	SIGNATURE	DATE	

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Texas Eastern Transmission, LP
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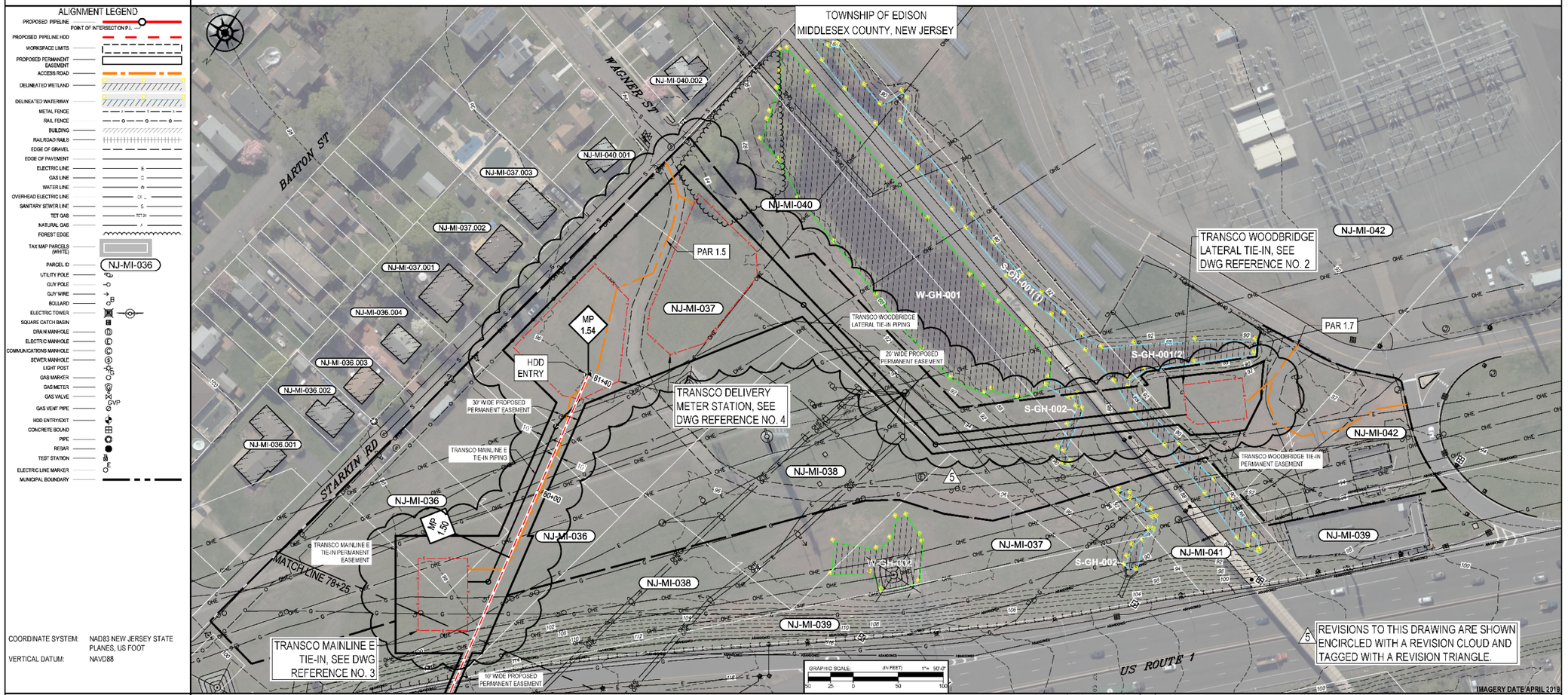
YEAR: 2021	W.B.S. CE.000171.001	SCALE: 1" = 50'	SHEET 7 OF 8	REV. 5

RIGHT-OF-WAY						
TRACT NUMBERS	NJ-MI-036	NJ-MI-037	NJ-MI-040	NJ-MI-037 NJ-MI-037	NJ-MI-040	NJ-MI-041	NJ-MI-042
OWNERSHIP / AGENCY	300'	298'	239'				
	78+33 OVERHEAD ELECTRIC 78+33 UNDERGROUND ELECTRIC 78+33 TELEPHONE 78+49 GASLINE	79+44 OVERHEAD ELECTRIC	79+96 OVERHEAD ELECTRIC 79+97 GASLINE 80+11 UNDERGROUND TELEPHONE 80+53 OVERHEAD ELECTRIC 80+62 COMMUNICATION	80+84 OVERHEAD ELECTRIC	81+49 HDD ENTRY TRANSCO T-MAIN		
CLASS LOCATION							
PIPE MATERIAL							



ENVIRONMENTAL DATA	
SITE SPECIFIC E & S	

FOR PERMITTING PURPOSES ONLY
04-21-20

DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	DATE
	REFERENCE DRAWINGS				REVISIONS	
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3	LIND-G-1004 - TRANSCO MAINLINE E TIE-IN	2	DTO	MMM	REVISED PER J.D. HAIR HDD DESIGN	12-20-19
2	LIND-G-1003 - TRANSCO WOODBRIDGE LATERAL TIE-IN	1	DTO	MMM	REVISED WS PER DESIGN COMMENTS	12-05-19
1	LIND-G-1001 - MEP LINE 20 TIE IN SITE PLAN	0	DTO	MMM	ISSUED FOR PERMITTING	11-25-19
5	FERC SUPPLEMENTAL FILING NO. 1	5	BK	MDW		04-21-20

ITEM NO.	DESCRIPTION	LN. FT.
	MATERIALS	

DRAWN BY:	ENGINEERING APPROVALS				
SER - D.OAKES	BID		CONSTRUCTION		
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YEAR: 2021	W.B.S. CE.000171.001	SCALE: 1" = 50'	SHEET 8 OF 8	REV. 5

APPENDIX D

Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Table D-1. Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Project, Developer	County, State	Description	FERC Docket or Federal / State Permit Number	Approx. Permanent Impact Area (acres or miles)	Potentially Overlapping Resources[1]	Current Status and Schedule	Distance and Direction from Project (miles)
Natural Gas Activities							
Transco Interconnect Activities associated with the Middlesex Extension Project Transcontinental Gas Pipe Line Company, LLC	Middlesex, NJ	Transco would construct above and belowground facilities associated with the interconnect from the Middlesex Extension Project including taps, check valve, over-pressure protection facilities, and related appurtenances.	Blanket Certificate authority issued in Docket No. CP82-426	Under 0.25 acre	*Minor Project** Water, Wildlife, and Vegetation Resources, Geological Resources, Soils, Land Use, Recreation and Aesthetics, Noise, and Air (Construction).	Planning Stage	Near the southern extent of the Middlesex Extension Project.

[1] Geographic Scope definitions: *minor projects, including residential development, small commercial development and small transportation projects.
**major projects, including large commercial, industrial, transportation and energy development projects (natural gas pipeline).
***major projects within USGS NHD HUC-12 Subwatersheds areas crossed by the pipeline.

Table D-1 (cont). Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis							
Transportation Activities							
Project, Developer	**County, State**	**Description**	**FERC Docket or Federal / State Permit Number**	**Approx. Permanent Impact Area (acres or miles)**	**Potentially Overlapping Resources[1]**	**Current Status and Schedule**	**Distance and Direction from Project (miles)**
I-287 North Bridge Construction New Jersey Department of Transportation	Middlesex, NJ	Resurfacing the bridge for the I-287 north and U.S. Route 1 interchange in Edison Township, New Jersey.	N/A	Interchange	*Minor Project** Wildlife, Vegetation, Land Use, Recreation, and Aesthetics.	In Progress	0.27/South
Grove Avenue Bridge over Port Reading Railroad Rehabilitation Project New Jersey Department of Transportation	Middlesex, NJ	Rehabilitation and replacement of the Grove Avenue bridge that runs over the Port Reading railroad that has been determined to be structurally deficient and functionally obsolete.	N/A	Unknown	*Minor Project** Wildlife,Vegetation, Land Use, Recreation, and Aesthetics.	On-going (2021)	0.35/North

Table D-1 (cont). Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Transportation Activities

Project, Developer	County, State	Description	FERC Docket or Federal / State Permit Number	Approx. Permanent Impact Area (acres or miles)	Potentially Overlapping Resources[1]	Current Status and Schedule	Distance and Direction from Project (miles)
Northeast Corridor Upgrades Project AMTRAK	Middlesex, NJ	A very minor road crossing for an installation of a new stormwater pipe and grouting. Also, abandonment of the existing culvert.	1205-17-0009.1-FWW170001	Unknown	*Minor Project*** Water, Wetlands, Fish, Wildlife, Vegetation, Cultural Resources, Geological Resources, Soils, Land Use, Recreation, and Aesthetics, Construction Noise and Air Emissions.	Planning Stage	0.00/North and South

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***major projects within USGS NHD HUC-12 Subwatersheds areas crossed by the pipeline.

Table D-1 Cont). Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Electric Transmission and Distribution Activities

Project, Developer	County, State	Description	FERC Docket or Federal / State Permit Number	Approx. Permanent Impact Area (acres or miles)	Potentially Overlapping Resources[1]	Current Status and Schedule	Distance and Direction from Project (miles)
Sewaren-Metuchen 230kV Conversion Project PSE&G	Middlesex, NJ	PSE&G plans to build a replacement 230kV line that is designed to replace the current 138kV line.	Unknown	8 miles	*Major Project**** Water, Wetlands, Fish, Wildlife, Vegetation, Cultural Resources, Geological Resources, Soils, Land Use, Recreation, and Aesthetics, Construction Noise and Air Emissions.	Planning Stage	0.09/South

[1]Geographic Scope definitions: *minor projects, including residential development, small commercial development and small transportation projects.
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***major projects within USGS NHD HUC-12 Subwatersheds areas crossed by the pipeline.

Table D-1 Cont). Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Parkland, Residential and Commercial Activities

Project, Developer	County, State	Description	FERC Docket or Federal / State Permit Number	Approx. Permanent Impact Area (acres or miles)	Potentially Overlapping Resources[1]	Current Status and Schedule	Distance and Direction from Project (miles)
Ashley Furniture Store Expansion Factory Direct Enterprises	Middlesex, NJ	Proposed increase to square footage of furniture store building and additional parking at the Edison, NJ location.	#P3-2019	Unknown	*Minor Project** Water, Wetlands, Fish, Wildlife, Vegetation, Land Use, Recreation, and Aesthetics and Construction Noise.	Planning Stages	0.75/South

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***major projects within USGS NHD HUC-12 Subwatersheds areas crossed by the pipeline.

Table D-1 Cont). Past, Present, and Reasonably Foreseeable Projects Considered in the Cumulative Impacts Analysis

Other Activities

Project, Developer	County, State	Description	FERC Docket or Federal / State Permit Number	Approx. Permanent Impact Area (acres or miles)	Potentially Overlapping Resources[1]	Current Status and Schedule	Distance and Direction from Project (miles)
Roosevelt Park Upgrades Project Middlesex County, NJ	Middlesex, NJ	Proposed upgrades in Roosevelt Park in Edison Township include: replacement of two pedestrian foot bridges, installation of perimeter bulkhead to stabilize island improvements, restoration of landscaping and grading on island, and replacement of fencing and recreational walkway throughout park.	1205-02-0011.2-FHA-190001	Unknown	*Minor Project** Water, Wetlands, Fish, Wildlife, Vegetation, Cultural Resources, Geological Resources, Soils, Land Use, Recreation, and Aesthetics, Construction Noise and Air Emissions.	Planning Stages	0.12/North

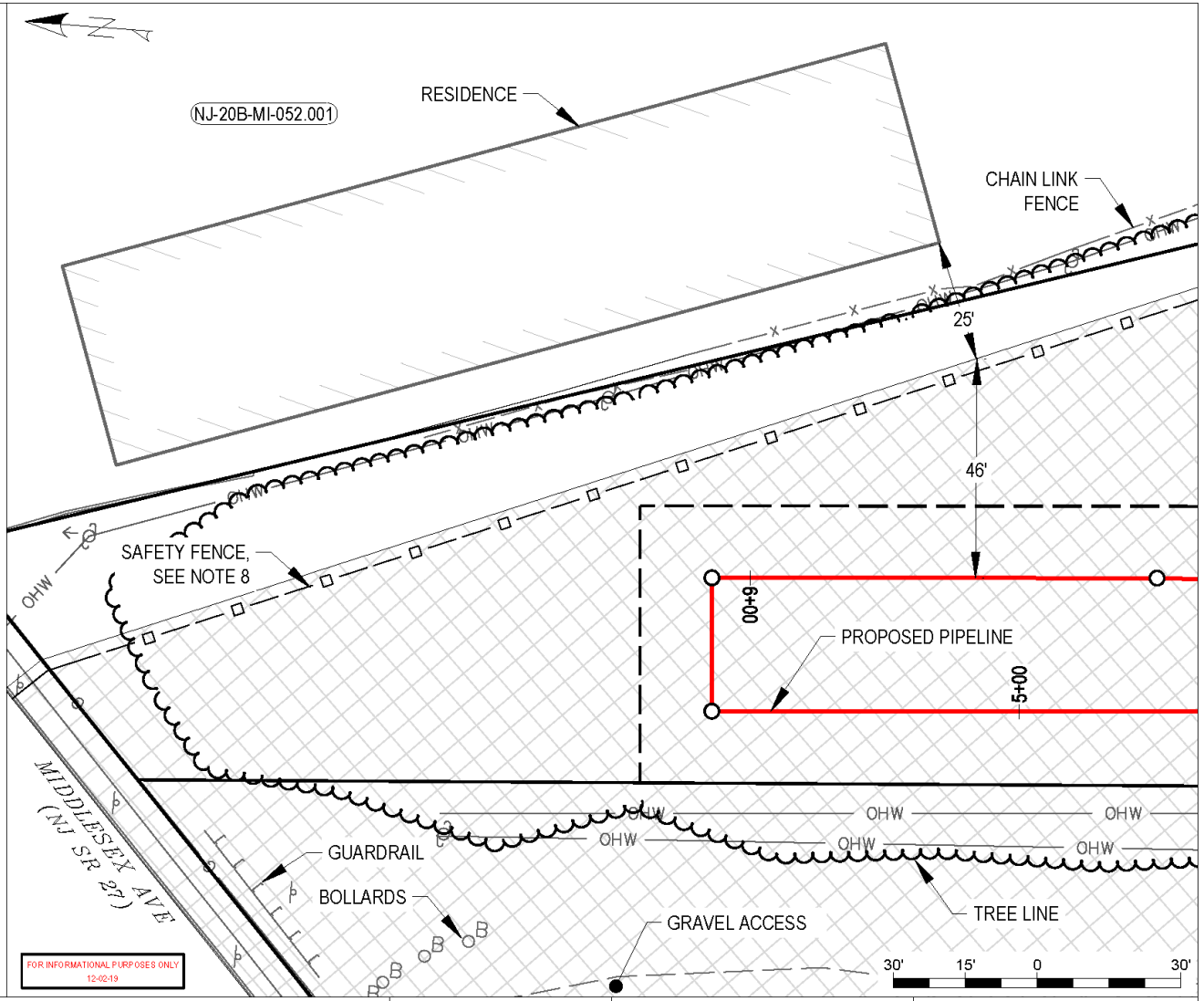
[1] Geographic Scope definitions: *minor projects, including residential development, small commercial development and small transportation projects.
**major projects, including large commercial, industrial, transportation and energy development projects (natural gas pipeline).
***major projects within USGS NHD HUC-12 Subwatersheds areas crossed by the pipeline.

APPENDIX E

Residential Site Plans

NOTES:

1. TEXAS EASTERN HAS PREPARED THIS RESIDENTIAL CONSTRUCTION PLAN TO INCLUDE DIMENSIONED SITE PLANS FOR EACH RESIDENCE LOCATED WITHIN 25' OF CONSTRUCTION WORK AREAS. THE SITE PLANS SHOW THE LOCATION OF EACH OF THESE RESIDENCES IN RELATION TO THE NEW PIPELINE AND CONSTRUCTION WORK AREAS PROPOSED FOR THE MIDDLESEX EXTENSION PROJECT.
2. OTHER KNOWN UTILITIES ARE ALSO DEPICTED ON THE SITE PLANS. PRIOR TO CONSTRUCTION, NEW JERSEY ONE-CALL WILL BE NOTIFIED TO VERIFY THE LOCATION OF THESE UTILITIES AND IDENTIFY ANY UNKNOWN UTILITIES WHICH MIGHT EXIST IN THE CONSTRUCTION RIGHT-OF-WAY. TEXAS EASTERN WILL ALSO CONTACT INDIVIDUAL PROPERTY OWNER(S) TO IDENTIFY AND LOCATE ANY OTHER UTILITIES THAT MIGHT EXIST WITHIN THE CONSTRUCTION RIGHT-OF-WAY. THESE UTILITIES WILL BE IDENTIFIED AND MARKED BY THE RESPECTIVE UTILITY COMPANIES PRIOR TO CONSTRUCTION.
3. ANY NEARBY STRUCTURES, RESIDENTIAL FEATURES LOCATED WITHIN THE CONSTRUCTION WORK AREAS IDENTIFIED AS NOT TO BE REMOVED DURING CONSTRUCTION ARE NOTED ON THE SITE PLAN.
4. TO MINIMIZE IMPACTS TO RESIDENCES, THE FOLLOWING CONSTRUCTION TECHNIQUES SHALL BE UTILIZED: DRAG SECTION OR STOVE PIPE (IF NEEDED). EXCAVATION OF THE TRENCH WILL NOT BE INITIATED UNTIL THE PIPE IS READY FOR INSTALLATION. THE PIPE TRENCH SHALL BE BACKFILLED IMMEDIATELY UPON COMPLETION OF PIPELINE INSTALLATION. DETAILS OF THESE CONSTRUCTION TECHNIQUES ARE DESCRIBED BELOW:
   - 4.a. DRAG SECTION: THE DRAG SECTION TECHNIQUE INVOLVES THE INSTALLATION OF SHORT SECTIONS (TWO OR MORE JOINTS) OF PIPE CALLED DRAG SECTIONS. THE CONTRACTOR WILL BEGIN THE DRAG SECTION INSTALLATION BY CLEARING AND GRADING A SHORT SECTION OF THE RIGHT-OF-WAY. INDIVIDUAL JOINTS OF PIPE WILL THEN BE HAULED TO THE WORK AREA AND LAID OUT FOR FABRICATION. THE CONTRACTOR WILL THEN FABRICATE THE DRAG SECTION BY WELDING TOGETHER TWO OR MORE PIPE JOINTS. THE CONTRACTOR WILL EXCAVATE THE TRENCH, THE AMOUNT OR LENGTH OF TRENCH EXCAVATED AT ANY GIVEN TIME WILL BE LIMITED TO THE MINIMUM NECESSARY TO INSTALL THE DRAG SECTION. THE PIPE SECTION WILL THEN BE LOWERED INTO THE TRENCH, THE TIE-IN WELD WILL BE PERFORMED, X-RAYED AND COATED, AND THEN THE PIPE SECTION IS BACKFILLED.
   - 4.b. STOVE PIPE (IF NEEDED): THE STOVE PIPE INSTALLATION TECHNIQUE IS SIMILAR TO THE DRAG SECTION INSTALLATION TECHNIQUE DESCRIBED ABOVE, EXCEPT IT IS LIMITED TO THE INSTALLATION OF ONE JOINT OF PIPE AT A TIME. THE TYPICAL SEQUENCE OF ACTIVITIES FOR STOVE PIPE INSTALLATION IS AS FOLLOWS: THE RIGHT-OF-WAY IS CLEARED AND GRADED, THE PIPE JOINT IS HAULED TO THE WORK AREA, THE TRENCH IS EXCAVATED, THE PIPE JOINT IS INSTALLED, WELDED (TIED-IN), X-RAYED, COATED, AND THEN THE TRENCH IS BACKFILLED. THIS PROCESS WILL BE REPEATED UNTIL THE WORK HAS BEEN COMPLETED IN THE AREA OF CONCERN.
5. ENBRIDGE WILL NOTIFY LANDOWNERS, IN WRITING PRIOR TO THE START OF CONSTRUCTION. TEXAS EASTERN'S LAND AGENT WILL THEN FOLLOW UP WITH EACH LANDOWNER AT LEAST ONE (1) WEEK PRIOR TO THE START OF CONSTRUCTION.
6. AFTER COMPLETION THE CONSTRUCTION WORK AREAS WILL BE RESTORED IN ACCORDANCE WITH APPLICABLE PERMIT REQUIREMENTS, THE PROJECT SPECIFIC VERSION OF FERC'S UPLAND EROSION CONTROL REVEGETATION AND AND MAINTENANCE PLAN, AND THE SOIL EROSION AND SEDIMENT CONTROL PLAN.
7. CLEARING OF MATURE TREES WILL BE LIMITED TO THAT REQUIRED TO SAFELY COMPLETE CONSTRUCTION.
8. AT A MINIMUM, CONSTRUCTION SAFETY PERIMETER FENCING SHALL BE INSTALLED AND MAINTAINED ALONG THE WORK AREA AS SHOWN ON THE SITE PLAN.
9. IN CONJUNCTION WITH NOISE MONITORING, TEXAS EASTERN WILL EMPLOY THE NECESSARY NOISE MITIGATION MEASURES TO ACHIEVE COMPLIANCE WITH PERMIT CONDITIONS AND THE FERC CERTIFICATE, WHICH MAY INCLUDE; NOISE SUPPRESSION DEVICES ON EQUIPMENT, NOISE ATTENUATING WALLS, TENT STRUCTURES, ALTERNATIVE SAFETY ALARMS ON VEHICLES, AND/OR OTHER MEASURES, AS APPLICABLE.



FOR INFORMATIONAL PURPOSES ONLY
12-02-19

LEGEND:

- PROPOSED ROUTE
- WORKSPACE LIMITS
- PROPOSED PERMANENT EASEMENT
- PROPERTY LINE
- UTILITY POLE
- GUY WIRE
- BURIED ELECTRIC (E)
- OVERHEAD WIRES (OHW)

LRC GROUP
Land Planning ~ Civil Engineering
Environmental Services ~ Land Surveying ~ Landscape Architecture
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MIDDLESEX EXTENSION PROJECT
PROPOSED 20" M/L
SITE-SPECIFIC RESIDENTIAL PLAN
LOC: MIDDLESEX COUNTY, NEW JERSEY

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2019	W.B.S.: CE.000171.001	SCALE: 1" = 30'	DWG. NJ-20B-MI-052.001.DWG	REV. 1

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2. OTHER KNOWN UTILITIES ARE ALSO DEPICTED ON THE SITE PLANS. PRIOR TO CONSTRUCTION, NEW JERSEY ONE-CALL WILL BE NOTIFIED TO VERIFY THE LOCATION OF THESE UTILITIES AND IDENTIFY ANY UNKNOWN UTILITIES WHICH MIGHT EXIST IN THE CONSTRUCTION RIGHT-OF-WAY. TEXAS EASTERN WILL ALSO CONTACT INDIVIDUAL PROPERTY OWNER(S) TO IDENTIFY AND LOCATE ANY OTHER UTILITIES THAT MIGHT EXIST WITHIN THE CONSTRUCTION RIGHT-OF-WAY. THESE UTILITIES WILL BE IDENTIFIED AND MARKED BY THE RESPECTIVE UTILITY COMPANIES PRIOR TO CONSTRUCTION.
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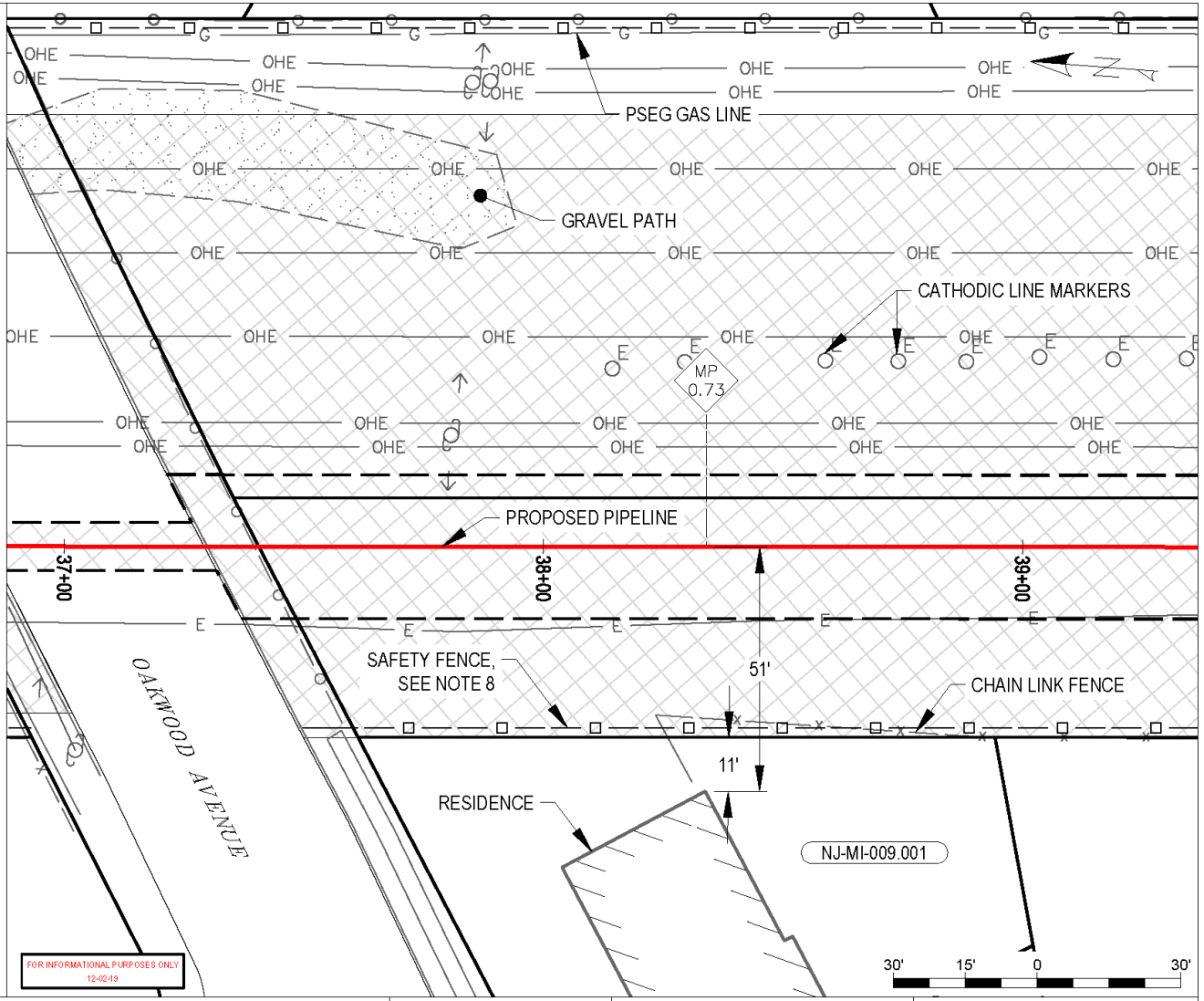

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PROPOSED PERMANENT EASEMENT
PROPERTY LINE
UTILITY POLE
GUY WIRE
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OHE

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Tel: 860.633.2877 Tel: 845.243.2880 Tel: 908.403.3726
LRC Engineering & Surveying, PPC, LRC Engineering & Surveying, LLC,
LRC Environmental Services, Inc., Lara Pesinis Consultants, Inc.

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PROPOSED 20" M/L
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LOC: MIDDLESEX COUNTY, NEW JERSEY

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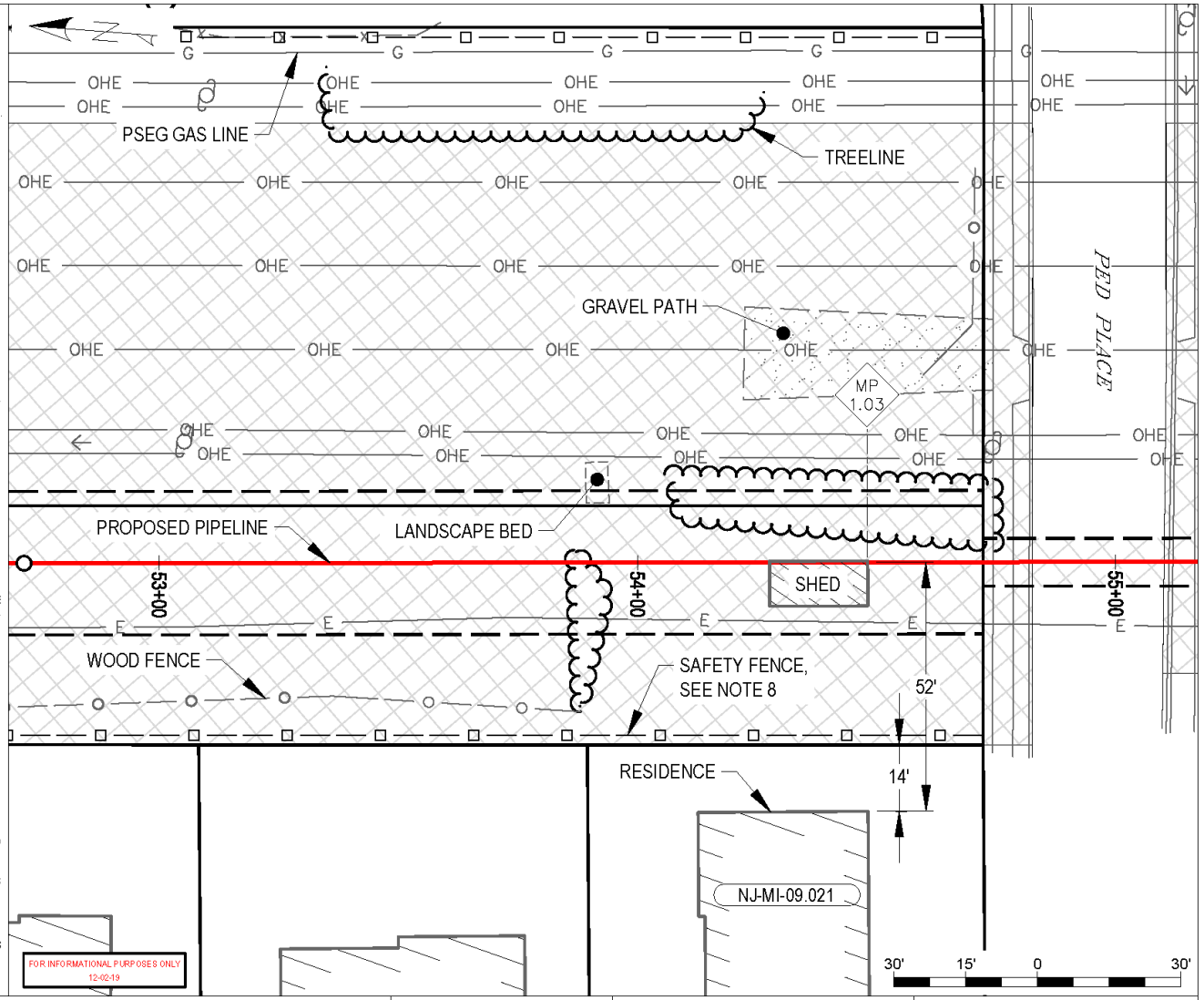
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2019	W.B.S.: CE.000171.001	SCALE: 1" = 30'	DWG. NJ-MI-009.001.DWG	REV. 1

NOTES:

1. TEXAS EASTERN HAS PREPARED THIS RESIDENTIAL CONSTRUCTION PLAN TO INCLUDE DIMENSIONED SITE PLANS FOR EACH RESIDENCE LOCATED WITHIN 25' OF CONSTRUCTION WORK AREAS. THE SITE PLANS SHOW THE LOCATION OF EACH OF THESE RESIDENCES IN RELATION TO THE NEW PIPELINE AND CONSTRUCTION WORK AREAS PROPOSED FOR THE MIDDLESEX EXTENSION PROJECT.
2. OTHER KNOWN UTILITIES ARE ALSO DEPICTED ON THE SITE PLANS. PRIOR TO CONSTRUCTION, NEW JERSEY ONE-CALL WILL BE NOTIFIED TO VERIFY THE LOCATION OF THESE UTILITIES AND IDENTIFY ANY UNKNOWN UTILITIES WHICH MIGHT EXIST IN THE CONSTRUCTION RIGHT-OF-WAY. TEXAS EASTERN WILL ALSO CONTACT INDIVIDUAL PROPERTY OWNER(S) TO IDENTIFY AND LOCATE ANY OTHER UTILITIES THAT MIGHT EXIST WITHIN THE CONSTRUCTION RIGHT-OF-WAY. THESE UTILITIES WILL BE IDENTIFIED AND MARKED BY THE RESPECTIVE UTILITY COMPANIES PRIOR TO CONSTRUCTION.
3. ANY NEARBY STRUCTURES, RESIDENTIAL FEATURES LOCATED WITHIN THE CONSTRUCTION WORK AREAS IDENTIFIED AS NOT TO BE REMOVED DURING CONSTRUCTION ARE NOTED ON THE SITE PLAN.
4. TO MINIMIZE IMPACTS TO RESIDENCES, THE FOLLOWING CONSTRUCTION TECHNIQUES SHALL BE UTILIZED: DRAG SECTION OR STOVE PIPE (IF NEEDED). EXCAVATION OF THE TRENCH WILL NOT BE INITIATED UNTIL THE PIPE IS READY FOR INSTALLATION. THE PIPE TRENCH SHALL BE BACKFILLED IMMEDIATELY UPON COMPLETION OF PIPELINE INSTALLATION. DETAILS OF THESE CONSTRUCTION TECHNIQUES ARE DESCRIBED BELOW:
   - 4.a. DRAG SECTION: THE DRAG SECTION TECHNIQUE INVOLVES THE INSTALLATION OF SHORT SECTIONS (TWO OR MORE JOINTS) OF PIPE CALLED DRAG SECTIONS. THE CONTRACTOR WILL BEGIN THE DRAG SECTION INSTALLATION BY CLEARING AND GRADING A SHORT SECTION OF THE RIGHT-OF-WAY. INDIVIDUAL JOINTS OF PIPE WILL THEN BE HAULED TO THE WORK AREA AND LAID OUT FOR FABRICATION. THE CONTRACTOR WILL THEN FABRICATE THE DRAG SECTION BY WELDING TOGETHER TWO OR MORE PIPE JOINTS. THE CONTRACTOR WILL EXCAVATE THE TRENCH, THE AMOUNT OR LENGTH OF TRENCH EXCAVATED AT ANY GIVEN TIME WILL BE LIMITED TO THE MINIMUM NECESSARY TO INSTALL THE DRAG SECTION. THE PIPE SECTION WILL THEN BE LOWERED INTO THE TRENCH, THE TIE-IN WELD WILL BE PERFORMED, X-RAYED AND COATED, AND THEN THE PIPE SECTION IS BACKFILLED.
   - 4.b. STOVE PIPE (IF NEEDED): THE STOVE PIPE INSTALLATION TECHNIQUE IS SIMILAR TO THE DRAG SECTION INSTALLATION TECHNIQUE DESCRIBED ABOVE, EXCEPT IT IS LIMITED TO THE INSTALLATION OF ONE JOINT OF PIPE AT A TIME. THE TYPICAL SEQUENCE OF ACTIVITIES FOR STOVE PIPE INSTALLATION IS AS FOLLOWS: THE RIGHT-OF-WAY IS CLEARED AND GRADED, THE PIPE JOINT IS HAULED TO THE WORK AREA, THE TRENCH IS EXCAVATED, THE PIPE JOINT IS INSTALLED, WELDED (TIED-IN), X-RAYED, COATED, AND THEN THE TRENCH IS BACKFILLED. THIS PROCESS WILL BE REPEATED UNTIL THE WORK HAS BEEN COMPLETED IN THE AREA OF CONCERN.
5. ENBRIDGE WILL NOTIFY LANDOWNERS, IN WRITING PRIOR TO THE START OF CONSTRUCTION. TEXAS EASTERN'S LAND AGENT WILL THEN FOLLOW UP WITH EACH LANDOWNER AT LEAST ONE (1) WEEK PRIOR TO THE START OF CONSTRUCTION.
6. AFTER COMPLETION THE CONSTRUCTION WORK AREAS WILL BE RESTORED IN ACCORDANCE WITH APPLICABLE PERMIT REQUIREMENTS, THE PROJECT SPECIFIC VERSION OF FERC'S UPLAND EROSION CONTROL REVEGETATION AND AND MAINTENANCE PLAN, AND THE SOIL EROSION AND SEDIMENT CONTROL PLAN.
7. CLEARING OF MATURE TREES WILL BE LIMITED TO THAT REQUIRED TO SAFELY COMPLETE CONSTRUCTION.
8. AT A MINIMUM, CONSTRUCTION SAFETY PERIMETER FENCING SHALL BE INSTALLED AND MAINTAINED ALONG THE WORK AREA AS SHOWN ON THE SITE PLAN.
9. IN CONJUNCTION WITH NOISE MONITORING, TEXAS EASTERN WILL EMPLOY THE NECESSARY NOISE MITIGATION MEASURES TO ACHIEVE COMPLIANCE WITH PERMIT CONDITIONS AND THE FERC CERTIFICATE, WHICH MAY INCLUDE; NOISE SUPPRESSION DEVICES ON EQUIPMENT, NOISE ATTENUATING WALLS, TENT STRUCTURES, ALTERNATIVE SAFETY ALARMS ON VEHICLES, AND/OR OTHER MEASURES, AS APPLICABLE.



LEGEND:

- PROPOSED ROUTE
- WORKSPACE LIMITS
- PROPOSED PERMANENT EASEMENT
- PROPERTY LINE
- UTILITY POLE
- GUY WIRE
- BURIED ELECTRIC (E)
- OVERHEAD ELECTRIC (OHE)

LRC GROUP
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Environmental Services ~ Land Surveying ~ Landscape Architecture
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LRC Environmental Services, Inc., Lara Pesinis Consultants, Inc.

MIDDLESEX EXTENSION PROJECT
PROPOSED 20" M/L
SITE-SPECIFIC RESIDENTIAL PLAN

LOC: MIDDLESEX COUNTY, NEW JERSEY

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Texas Eastern Transmission, LP
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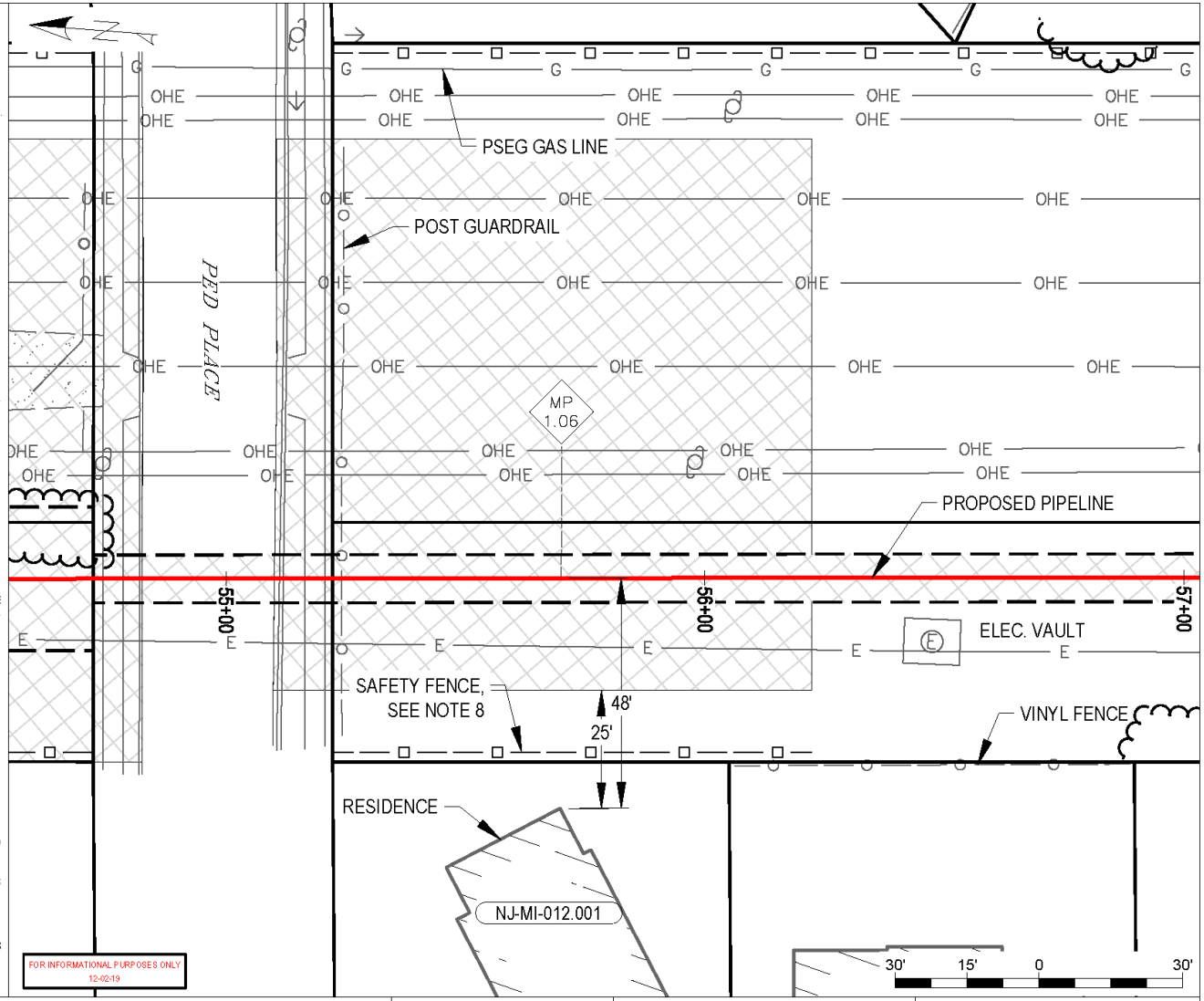

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